U. S. Government

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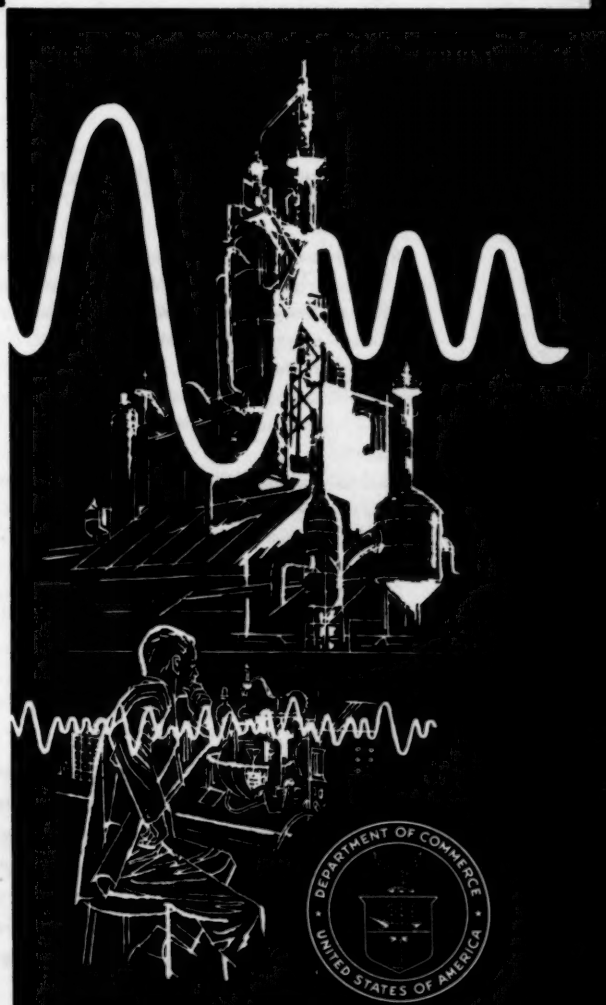

U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

OFFICE OF TECHNICAL SERVICES
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Salt Lake City, Utah 84100

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Volume 38	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-427 939 Div. 1, 9
OTS price $5.60

Federal Aviation Agency, Washington, D. C.
HEIGHT VELOCITY DIAGRAM FLIGHT TEST PROJECT ON THE BELL 47G3B HELICOPTER,
by T. W. Sanford, Jr., W. J. Hanley and Gilbert De Vore. May 63, 1v.
Unclassified report

Presented at the 19th Annual National Forum, American Helicopter Society, Inc., 1-2 May 63, Washington, D. C.

Descriptors: (*Helicopter, Flight testing), Airplane landings, Low altitude, Aerodynamic characteristics, Aviation safety, Velocity, Mathematical models, Height finding, Mission profiles, Landings, Climbing.

The variation of the Helicopter Height-velocity Diagram with altitude was determined for the Bell 47G-3B aircraft. The FAA analysis of the data resulted in a definite set of empirical mathematical equations. These empirical equations are known as the De Vore equations. Height-Velocity Diagram flight test data recorded at one density altitude can be used to compute the Height-Velocity Envelope at any other density altitude using the De Vore equations. These tests produced a large amount of high quality flight test time history data recorded on instrumentation installed in the test helicopter and on instrumentation installed on the ground at the test site. The Langley Laboratory of NASA is presently in the process of analyzing these data to assist them in producing a mathematical model of the Height-Velocity Diagram for autorotation landings for a helicopter using known configuration parameters. (Author)

AD-428 027 Div. 1, 9
OTS price $3.00

Chance Vought Corp., Dallas, Tex.
A RATIONAL METHOD FOR PREDICTING ALIGHTING GEAR DYNAMIC LOADS. VOLUME 1. GENERAL METHODS.
Rept. for 2 Feb 61-30 June 62,
by T. R. Ferguson, J. Mollick and W. W. Kitts.
Dec 63, 160p.
Contract AF33 616 7824, Proj. 1367, Task 136706
ASD TDR62 555, vol. 1 Unclassified report

Report on Structural Design Criteria.

Descriptors: (*Landing gear, Loading (Mechanics)), Motion, Equations, Landing impact, Impact shock, Airframes, Fuselages, Hydraulic systems, Inflatable structure, Aircraft tires, Skis, Parachute descents, Mathematical analysis, Mathematical prediction, Design, Structures.

A rational method for predicting alighting gear loads during landing impact is discussed. The equations describing the motions of a vehicle during landing impact are developed for an arbitrary vehicle configuration. The method is of sufficient generality and accuracy to allow the formulation of alighting gear dynamics problems in flight vehicles including V/STOL aircraft, high gross weight logistic vehicles, recoverable booster vehicles, advanced tactical and defense vehicles operating out of remote areas, and lunar vehicles. It allows for the effects of varying coefficients of friction and damping, combinations of initial conditions of pitch, roll, yaw angles and rates, vertical, longitudinal and lateral motion, slippage of the gear relative to the alighting surface, flexible alighting gear and vehicle structure, simultaneously applied triaxial ground loads, and various types and number of alighting elements. The formulation is intended for the cantilevered type of gear, although the articulated type may be handled through some extensions of the formulation. (Author)

AD-428 181 Div. 1, 9
OTS price $2.75

Chance Vought Aircraft, Dallas, Tex.
A RATIONAL METHOD FOR PREDICTING ALIGHTING GEAR DYNAMIC LOADS. VOLUME II EXAMPLES.
Rept. for 2 Feb 61-30 June 62,
by T. R. Ferguson, J. Mollick and W. W. Kitts.
Dec 63, 273p.
Contract AF33 616 7824, Proj. 1367, Task 136706
ASD TDR62 555, vol. 2 Unclassified report

Descriptors: (*Landing gear, Loading (Mechanics)), Motion, Equations, Airframes, Airplane panels, Landing impact, Impact shock, Stresses, Gravity, Aircraft, Jet bombers, Aircraft tires, Spikes, Penetration, Hydraulic systems, Hydraulic cylinders, Elasticity, Deflection, Mathematical analysis.

Several illustrative examples, with accompanying numerical solutions are provided as a didactic means of illustrating how the ''General Method'', Volume I (AD-428 027), is applied to various landing impact problems. Symmetrical landing of a conventional aircraft, asymmetrical landing of an advanced vehicle, spike penetration landing, cantilevered, articulated and semi-articulated gears are considered. (Author)

AD-428 263 Div. 1, 10, 18
OTS price $1.10

Army Combat Developments Command, Fort Belvoir, Va.
PROPOSED QUALITATIVE MATERIEL REQUIREMENT FOR AIR MOBILE AIRCRAFT REFUELING SYSTEM,
7 Jan 64, 12p.
Unclassified report

Descriptors: (*Helicopters, Refueling), (*Transport planes, Refueling), (*Fuel tanks, Air transportation), Utility planes, Airborne, Supply depots, Mobile, Military tactics, Military requirements, Storage tanks, Logistics, Maintenance, Cost, Army aircraft, Armed forces operations, Human engineering, Performance engineering, Limited war, Short take-off planes.

Requirements are outlined for a simple and lightweight POL refueling and delivery system to temporarily convert Army fixed and rotary wing cargo and utility aircraft into airmobile bulk fuel tankers. The system will provide a capability for rapid delivery or acceptance of POL bulk product between the airmobile tanker, storage tanks and aircraft to be fueled. The system will consist of a container of approximately 500 gallons, a quality control device, a means of evacuating fuel from the container, hoselines, nozzles and quick fit couplers and manifolding. Each system will be capable of being connected to additional containers to provide for fuel delivery from more than one container through a single quality control device and four hoselines. This system is a new item and will not be a replacement for existing items. The fuel system will be used by Air Assault Divisions engaged in moving island combat operations, Special Action Forces, and by other units utilizing or being supported by aircraft in forward areas. The equipment will be used for training and will be utilized extensively in all combat areas, including cold and limited war operations. The system will be transported in UH-1, CH-47, and CV-2 Army aircraft. (Author)

AD-428 384 Div. 1, 30
OTS price $5.60

Air Force Flight Test Center, Edwards Air Force Base, Calif.
EVALUATION OF TAKE-OFF AND LANDING FACILITY,
by Albert E. Taylor. Apr 58, 15p.
AFFTC FTFF TM58 12 Unclassified report

Descriptors: (*Test facilities, Aircraft), (*Flight testing, Instrumentation), Take-off, Airplane landings, Optical tracking, Photographic recording systems, Phototheodolites, Theodolites, Data, Position finding, Ranges (Distance)

Static and dynamic tests were conducted to evaluate the AFFTC take-off and landing facility and to establish the degree of accuracy that can be expected when the facility is employed to obtain aircraft performance data during flight testing. The most accurate position data is obtained when a two-station Askania theodolite solution is employed. It was also found that, under certain conditions, the accuracy of the data resulting from a single station Askania theodolite solution approached that of the two-station solution. The facility is described and the results of the evaluation test are presented. (Author)

AD-428 430 Div. 1
OTS price $12.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FLIGHT SAFETY (Bezopasnost Poletov),
by I. G. Rabkin. 14 Oct 63, 171p.
FTD TT63 637 Unclassified report

Trans. from Voyennoye Izdatel'stvo Ministerstva Oborony SSSR, Moskva, pp. 1-135, 1962.

Descriptors: (*Aviation safety, Textbooks), All-weather aviation, Failures (Mechanics), Rescues, Survival, Airspeed, Airplane Landings, Abandonment, Flight speeds, Storms, Checkout procedures, Angle of attack, Hazards, Aeronautics, Aviation accidents, Aviation personnel, Plots, Parachute jumping, Ejection seats, Errors, Bail-out.

Hazardous flight regimes and the causes and consequences of the most frequently encountered errors in the technique of landing piloting are analyzed. The actions of the pilot to ensure flight safety under complex weather conditions are described, as well as errors committed by the crew leading to the creation of an emergency flight situation and recommendations to prevent these errors. The author devotes attention to the actions of the crew during failure of the aircraft equipment during flight. The methods of abandoning an aircraft by parachute or with the aid of an ejection seat are described. Special attention is given to the control and guidance of the plane in the air, and also to the readiness of the pilot for flying. The book is intended for flight and engineering personnel in all branches of aviation, and also for academy students and students of aeronautical engineering schools. (Author)

AD-428 464 Div. 1, 9, 25, 15
OTS price $3.60

University of Southern Calif., Los Angeles.
KINETIC EQUATIONS OF THE BOGOLYOUBOV THEORY OF CLASSICAL GASES AS DERIVED FROM THE MARKOVIAN VERSION OF THE PRIGOGINE THEORY,
by J. Stecki and H. S. Taylor. 11 Jan 62, 27p.
Contract Nonr22823, Proj. NR013 307
Unclassified report

Descriptors: (*Kinetic theory, Entropy), (*Statistical mechanics, Gases), Irreversible processes, Thermodynamics, Statistical processes, Differential equations, Fluid mechanics, Motion.

The Bogolyoubov Theory of irreversible processes in classical gases in the coupling-parameter version and for homogeneous systems, as recently generalized by J. Stecki, is discussed and evaluated within the framework of the Prigogine theory. It is proved that it leads exactly to the Markovian equation for the velocity distribution as derived by Prigogine and Resibois. The conjecture, made by Prigogine and Resibois is confirmed (Author)

AD-428 531 Div. 1
OTS price $2.60

Air Force Special Air Warfare Center, Eglin Air Force Base, Fla.
U-10 FLOATPLANE EVALUATION,
by Neale J. Schmidt. Dec 63, 23p.
1 CAG Proj. 2F8
SAWC TDR63 17 Unclassified report

Descriptors: (*Utility planes, Water-based airplanes), Feasibility studies, Guerrilla warfare, Operation, Handling, Flight instruments, Military training, Military requirements, Effectiveness.

This evaluation was established to determine the feasibility of conducting training in the U-10 Floatplane at Hurlburt Lake, Eglin Auxiliary Field No. 9, Florida, and to establish the requirements for training 1st Air Commando Wing aircrews. It is concluded that this training can be conducted on Hurlburt Lake with certain restrictions. A suggested training outline is included as an appendix to the report. (Author)

AD-428 614 Div. 1, 12
OTS price $9.10

Research and Technology Div., Air Force Systems Command, Washington, D. C.
AN INVESTIGATION OF THE ABRUPT ACCELERATION

PROPERTIES OF THE PROTOTYPE NET CREW SUPPORT-RESTRAINT SYSTEM,
by Richard L. Peterson. Oct 63, 28p.
Proj. 1425, Task 142502
RTD FDFR TM63 25 Unclassified report

Descriptors: (*Aircraft seats, Impact shock), (*Aviation safety, Aircraft seats), Acceleration tolerance, Deceleration, Instrumentation, Aerospace craft, Spacecraft seats.

Abrupt acceleration characteristics were evaluated for the net seat concept during ground impact. Two series of abrupt acceleration experiments are described: the first series included evaluation of the prototype net crew seat utilizing fully-instrumented and articulated anthropomorphic dummies and the second series included both fully-instrumented dummies and human volunteer test subjects. Acceleration time history oscillograph traces are included for both series of experiments and contain acceleration forces in g units versus time in seconds for the head, chest, and knee, and for the center of gravity and head area of the impact test vehicle. The net crew seat prototypes were evaluated only for unidirectional impact accelerations involving velocity changes which are lower than those encountered in operational systems during ground landing impact. During the human abrupt acceleration experiments conducted at an impact velocity of 15 ft/sec, a peak of 35.5g was recorded on the chest. No injuries resulted during this series of human abrupt acceleration experiments. Analysis of the oscillograph traces and 16 mm movie data revealed a major problem area, seat occupant oscillation (rebound) during ground impact; several solutions for the elimination of this problem are discussed. (Author)

AD-428 617 Div. 1
OTS price $2.60

Chance Vought Corp., Dallas, Tex.
XC-142A VTOL TRANSPORT PROGRAM.
Semiannual rept. no. 3, Jan-June 63.
June 63, 23p.
Contract AF33 657 7868
Unclassified report

Descriptors: (*Vertical take-off planes, Manufacturing methods), Transport planes, Scheduling, Tests, Test methods, Machine tools, Aerodynamic control surfaces, Wind tunnel models, Model tests.

Progress on the XC-142A program is reported. Numerous test programs were initiated and some completed, including the basic wind tunnel tests of the 0.110 scale model and the control system bearing wear tests. The tooling effort reached its peak at the end of June with approximately 72% of the overall tooling task having been completed. (Author)

AD-428 998 Div. 1, 12, 27
OTS price $4.00

Kaman Aircraft Corp., Bloomfield, Conn.
INVESTIGATION OF STORED ENERGY ROTORS FOR RECOVERY.
Final technical documentary rept.
Dec 63, 261p. Rept. no. R467
Contract AF33 616 7544, Proj. 6065, Task 606501
ASD TDR63 745 Unclassified report

Descriptors: (*Rotorchutes, Design), Recoverable boosters, Atmosphere entry, Recovery, Drag, Flight paths, Supersonic characteristics, Descent trajectories, Weight, Stability, Aerodynamic heating, Deceleration, Model tests, Wind tunnel models, Transonic characteristics, Test methods, Centrifugal fields, Speed regulators, Performance (Engineering), Springs, Load distribution, Tests, Flight testing, Nose cones, Space capsules, Manned spacecraft, Lift, Torque, Moments, Control, Control systems, Reentry vehicles, Landings, Deceleration.

Analytical studies on the performance, stability, and control characteristics of rotary-wing decelerators in axial descent, controlled glide flight, and flared landings were performed to investigate the potential capabilities of stored energy rotor systems for the retardation and controlled recovery of payloads. Rotor parameters such as diameter, solidity, disc loading, mass, etc., were considered. Theoretical predictions are compared with experimental test results. Wind tunneltests simulating typical re-entry trajectory altitude and dynamic conditions were performed on a rotary-wing decelerator system, similar in configuration and construction to the free-flight test rotor system, at speeds from Mach 0.5 to 3.0 to demonstrate feasibility of deploying and operating such systems at supersonic speeds in axial flow and to determine the rotor and governor characteristics for such an operation. (Author)

AD-429 102 Div. 1, 19
OTS price $10.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FLIGHT-NAVIGATION INSTRUMENTS: INSTRUMENT FLYING (THE PILOTING OF A PLANE BY INSTRUMENTS) (Pilotazhno-navigatsionnyye pribory (o pilotirovanii samoleta po priboram),
by V. G. Denisov and R. N. Lopatin. 11 Oct 63, 123p.
FTD TT63 636 Unclassified report

Trans. from Voyennoye Izdatel'stvo Ministerstva Oborony SSSR, pp. 1-111, 1962.

Descriptors: (*Instrument flight, Textbooks), (*Flight instruments, Textbooks), Flight control systems, Automatic pilots, Adaptive control systems, Flight instruments, Instrument panels, Low-altitude bombing, Airplane landings, Aviation safety, Navigation, Landing aids, Take-off, Climbing, Taxiing, Pilots.

Contents: Aircraft Instruments--Measuring instruments, Instruments indicating deviation from fixed parameter values, Combined instruments, Directing (command) devices, Integrated instruments, Indicating devices, Arrangement of instruments and components upon the instrument panel; Instrument Flying--Peculiarities of flight beyond the visibility of the ground and horizon, Takeoff, Level flight, Climb, Flight along a route, Positional air navigation systems, Dead reckoning, Inertial navigation systems, Indication of navigation parameters, Descent, Landing; Instrument Flying Under Special Conditions--Low-altitude bombing, Attacking an airborne target, Departure from a complex situation, Flight using support instruments; New Types of Aircraft Instrumentation--Integrated systems of flight-navigation instruments, Visual flight analogs.

AD-429 113 Div. 1, 19
OTS price $3.60

Princeton U., N. J.
AN EXPLORATORY STUDY OF INSTRUMENT APPROACHES WITH STEEP GRADIENT AIRCRAFT,
by E. Seckel, J. J. Traybar and G. E. Miller.
Oct 63, 30p. Rept. no. 630
Contract DA44 177TC834, Task 1D121401A14203
ATRECOM TR63 28 Unclassified report

Descriptors: (*Helicopters, Instrument flight), (*Instrument landings, Helicopters), Flight instruments, Instrument panels, Vertical indicators, Approach indicators, Glide path systems, Flight testing, Performance (Engineering), Radio beams.

A series of flight tests of an exploratory nature was conducted to determine the influence of certain parameters and quickened cross-pointer presentations on instrument approaches with steep gradient aircraft. Approximately 50 hooded instrument approaches were flown using a single-rotor helicopter piloted by a highly experienced NASA test pilot. Standard flight instruments were used and the tracking presentation for the pilot consisted of an ILS type cross-pointer indicator. Parallel beam patterns as well as the standard angular, wedge-shaped ILS beam patterns were simulated by a tracking theodolite system coupled to the aircraft cross-pointer by a radio link. Numerous beam widths, glide slope inclination angles, and quickening inputs were investigated. The maximum glide slope inclination angles studied were in the 8 to 11 degree range because of operational limitations of the aircraft and task (30 knots minimum airspeed and 500 feet per minute maximum rate of descent). Parallel beam patterns (constant sensitivity) were preferred over the standard angular wedge-shaped beam patterns (sensitivity varying with range from transmitter). No significant improvements were obtained with the quickened presentation in preference to the pure displacement presentation. (Author)

AD-429 303 Div. 1
OTS price $4.60

Thurston Erlandsen Corp., Sanford, Maine.
FLIGHT TEST OF THE HYDRO - SKI RESEARCH VEHICLE HR V - 1 EQUIPPED WITH THE PBM TYPE SKI.
Final summary rept.,
by David B. Thurston. 25 Nov 63, 27p.
Rept. no. 6302 4
Contract N600 10 59309
Unclassified report

Descriptors: (*Amphibian planes, Hydro-skis), (*Hydro-skis, Flight testing), Flight testing, Taxiing, Take-off, Tests, Test methods, Airplane landing, Drag, Performance (Engineering), Design, Instrumentation, Wiring diagrams, Research planes, Thrust, Load distribution, Weight.

Performance characteristics, water loadings, and design impressions obtained during evaluation of a one-third scale PBM type hydro-ski mounted on the HRV-1 Amphibian are presented. Flight test work undertaken included taxi, take-off, and landing runs at various gross weights, ski extensions, ski areas, wind conditions and sea states. Recorded data included axial, drag, lateral, and torsional loadings, airplane pitch and speed, and moving pictures of the HRV-1 and ski. Comparison of these data with those previously obtained from the PBM program, indicated that the HRV-1 provided scale representation of the PBM test bed and ski. (Author)

AD-429 121 Div. 1, 30
OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
MONITOR AIR FORCE ENVIRONMENTAL TESTS OF THE MODEL F-4C AIRPLANE.
Final rept.
14 Jan 64, 5p.
Task RA1200001
NATC ST363 5R64 Unclassified report

Descriptors: (*Jet fighters, Environmental tests), Turbojet engines, Fuel systems, Hydraulic systems, Pneumatic systems, Landing gear, Jet engine fuels, Electronic equipment, Electrical equipment, Afterburners, Low temperature research, Failure (Mechanics), Malfunctions, Radar, Test methods.

U. S. Air Force environmental tests of the Model F-4C airplane in the Climatic Hangar were monitored. The airplane is a two place (tandem), supersonic, long range, all-weather fighter-bomber powered by two J79-GE-15 single-rotor, axial-flow, variable stator turbojet engines with afterburners. The airplane was tested by the Air Force under controlled environmental temperature conditions from 120 F down to and including -65 F. The airplane was positioned on jacks and tied down for high power engine operation. Functional tests of various systems were conducted at all test temperatures. JP-4 fuel was used throughout the tests. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-427 989 Div. 2
OTS price $2.60

Space Sciences Lab., U. of Calif., Berkeley.
SOME REMARKS A PROPOS OF PRESENTLY KNOWN MAGNETO-TELLURIC INVESTIGATION AND SOUNDING CURVES,
by H. Fournier, tr. by S. H. Ward and H. Fournier.
19 Nov 63, 17p. Series 4, Issue 79
Contract Nonr22289
Unclassified report

Trans. from Acta Technica, Academiae Scientiarum Hungaricae, Tomus 43, Fasciculi 3-4, pp. 453-466.

Descriptors: (*Terrestrial magnetism, Geophysics), Stratigraphy, Geology, Diurnal variations, Sedimentary rock.

The examination of a collection of observed magnetotelluric amplitude curves, interpreted by the Tichonov-Cagniard method, shows three tendencies: (1) For the very long periods (diurnal or nearly so), this examination indicates the presence of a very conductive layer in the Upper Mantle. This layer should be situated at various depths, depending upon the region studied, between 250 and 1100 km, in accordance with the hypothesis of Tichonov-Lipskaya. (2) It appears frequently that the curves for the two orthogonal cardinal directions, for any one location, are different or sometimes very different. (3) It seems, for the rapid periods (about one second), that if the sedimentary basis is thick, then the mean value of the magnetotelluric apparent resistivity is low; this conclusion, however, requires substantiation by more experimental information. (Author)

AD-427 990 Div. 2
OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
ON THE HARD X-RAY EMISSION OF SOLAR FLARES,
by L. S. Levitsky; tr. by Alice B. Dunn. 1963. 7p.
SPO SRN48 Unclassified report

Descriptors: (*Solar flares, X-rays), (*X-rays, Emissivity), Reflection, Frequency, Ionospheric disturbances, Electron density, Electrons, Energy, Intensity, X-ray spectroscopy, X-ray spectrum, Ionosphere, Anomalies.

A method is proposed for the determination of the effective wavelength lambda sub eff of the X-ray emission of chromospheric flares at the moment of maximum of a SID. The method is based on the utilization of data on the f sub m in reflection frequencies, obtained from World Data Center Ionospheric Stations, and is used for determining the lambda sub eff of seven flares. The derived values are within the limits 2-3 A. (Author)

AD-427 991 Div. 2, 8
OTS price $4.60

Sparton Corp., Jackson, Mich.
THE ENVIRONMENTAL METEOROLOGICAL DATA SYSTEM.
Final engineering rept.
2 Oct 63, 41p.
Contract AF08 606 5719
AFMTS TDR63 8 Unclassified report

Descriptors: (*Radiosondes, Reliability), Guided missile ranges, Radiofrequency interference, Electromagnetic waves, Compatibility, Meteorological instruments, Design, Sensitivity, Reliability (Electronics), Production, Tests, Test equipment.

The object of the work performed was to develop a Radiosonde compatible with the operational electromagnetic environment of the Atlantic Missile Range. The presence of high-level radiation on adjacent frequencies make the standard AN/AMQ-9 unreliable in such an environment. Design objectives were (1) improved selectivity, (2) tuned frequency stability, (3) improved dynamic range, (4) reduced susceptibility to spurious responses and (5) provide five (5) channels with provisions for selection of one by changing one (1) component. (Author)

AD-428 025 Div. 2
OTS price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
VORTICAL CLOUD PATTERNS ON THE LEEWARD SIDE OF ISLANDS.
Final rept.,
by Lu Ting. Nov 63, 15p. PIBAL Rept. no. 818
Grant WBG12
Unclassified report

Descriptors: (*Cloud cover, Vortices), Islands, Theory, Analysis, Satellites (Artificial), Images, Deflection, Degradation, Fluid dynamic properties, Mathematical analysis, Energy, Viscosity, Reynolds number, Diffusion.

A theoretical analysis has been conducted of the vortical cloud patterns on the leeward side of islands recently observed by Tiro satellites. A plausible theory for these cloud patterns is advanced. The disturbance created by a flat island will be replaced by that of a horseshoe vortex and its image. The deflection of the trailing vortex lines is obtained explicitly. The location of the observed vortex-like cloud is then interpreted as the intersection of the deflected trailing vortex line with the inversion level. Another plausible theory on the vortex cloud patterns is also presented, together with its shortcomings. An outline of the procedure of the analytical solution of the lifetime of a viscous vortex in a non-uniform stream is also presented. (Author)

AD-428 053 Div. 2
OTS price $1.10

Saskatchewan U. (Canada).
AURORAL PATCHES SHOWING STRONG HYDROGEN LINES,
by L. E. J. Montbriand and A. Vallance Jones.
1963, 4p. SR DR1
Contract AF19 628 2829, Proj. 7661, Task 766102
AFCRL 63 613 Unclassified report

Reprint from Canadian Journal of Physics, vol. 41, pp. 1393-1395, 1963. (Copies also available from DDC)

Descriptors: (*Aurorae, Spectra (Visible and ultraviolet)), Hydrogen, Astronomical cameras, Spectrographic cameras, Spectrographic analysis, Photographs, High-speed cameras.

Observation is reported with an all-sky camera and high speed patrol spectrograph of a peculiar auroral cloud in the early evening of the night of April 26/27, 1960, showing strong hydrogen lines. The observation is of interest since no similar one was obtained in a series of 2,000

spectrograms. Usually auroral clouds appear after the breakup of strong aurora later in the evening and do not exhibit intense hydrogen emission. (Author)

AD-428 069 Div. 2, 30
OTS price $2.60

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept. for Dec 63.
Dec 63, 22p.
Contract CWB10704
Unclassified report

Descriptors: (*Weather forecasting, Research program administration), Data processing systems, Programming (Computers).

A report is given of the progress made in this weather-forecasting project.

AD-428 086 Div. 2
OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
AN INVESTIGATION OF THE X-RAY EMISSION OF SOLAR FLARES BY THE RADIO ASTRONOMICAL METHOD,
by Y. I. Neshpor, tr. by Alice B. Dunn. 1963, 9p.
SPO SRN49 Unclassified report

Descriptors: (*Solar flares, Cosmic rays), Ionosphere, X-rays, Extraterrestrial radio waves, Line spectrum, Ionospheric disturbances, Absorption, Noise (Radio), Ionization.

The following conclusions are based on a study of the frequency dependence of the attenuation of cosmic radio noise during sudden ionospheric disturbances: (1) the spectral distribution of the X-ray emission intensity of flares varies for each flare, and (2) some solar flares are characterized by an appreciable intensity increase of X-ray emission in the short-wave region. (Author)

AD-428 095 Div. 2, 6
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
SPACE PHYSICS PROGRAM.
Semiannual technical note, 1 Jan-30 June 63.
15 Nov 63, 1v. Rept. no. TDR169 3260 01TN2
Contract AF04 695 169
SSD TDR63 313 Unclassified report

Descriptors: (*Albedo (Astronomy), Earth), Space environment conditions, Spectrum analyzers, Spectrophotometers, Fast neutrons, Van Allen Radiation belt, Electron density, Very low frequency, Whistlers, Detectors, Electrostatic fields, Mapping, Radiation measurement systems, Ozone, Meteorological satellites, Radiometers, Satellites (Artificial), Ultraviolet radiation, Infrared radiation.

A scanning monochromator system to measure the earth's albedo in the wavelength interval from 1600 to 3100 A has been developed to the final design stage. Spectrometers flown on Air Force low-orbiting satellites have provided data on the fluxes, energy distributions, and lifetimes of Soviet-injected electrons; another study concerning the radiation belts dealt with the role of very-low-frequency waves in precipitating fast electrons. Also, data from measurements of electron fluxes and spectra above 900 kev at altitudes between 200 and 700 km have been analyzed. A Faraday Cup detector has been constructed for use in measuring low-energy electrons and protons in space. The Particle Radiation Mapping Program (PRAM) is continuing; a summary is presented of the first instrument payload to be flown. Optical radiation measurements have been made to the vertical distribution of ozone and the radiance of the atmosphere in the ultraviolet. Also, data on a satellite experiment to measure the infrared background radiations of the earth were analyzed. (Author)

AD-428 161 Div. 2, 12
OTS price $1.60

Chicago U., Ill.
TIROS III MEASUREMENTS OF TERRESTRIAL RADIATION AND REFLECTED AND SCATTERED SOLAR RADIATION,
by S. H. H. Larsen, T. Fujita and W. L. Fletcher.
Oct 63, 11p. RP20
Unclassified report

Descriptors: (*Radiation measurement systems, Meteorological satellites), (*Solar radiation, Measurement), Radiometers, Reflection, Analysis.

The distribution of outgoing terrestrial radiation within the 8- to 12- micron band, over North Africa, is presented together with the pattern of reflected solar radiation. The analyses are based on data from analog traces of the five-channel medium resolution scanning radiometer on TIROS III. The data which have been used are obtained from measurements made under conditions favorable to the angular resolution of the radiometer, which changes as the satellite spins and progresses along its path; and a pattern of differential heating over the desert area was observed. Calculations of the rate of reflectance over the Sahara desert have been made and the values obtained over the sand dunes, about 23%, appear to be realistic. These radiation data have also been used in a study of the anisotropic nature of scattered radiation; the results of this approach indicate the ability of the satellite to give valuable measurements in the study of scattering properties of the atmosphere. (Author)

AD-428 164 Div. 2, 6, 12
OTS price $1.60

Chicago U., Ill.
THE DECAYING STAGE OF HURRICANE ANNA OF JULY 1961 AS PORTRAYED BY TIROS CLOUD PHOTOGRAPHS AND INFRA-RED RADIATION FROM THE TOP OF THE STORM,
by T. Fujita and J. Arnold. Nov 63, 13p. RP28
Unclassified report

Presented at the Third Technical Conference on Hurricanes and Tropical Meteorology, June 6-12, 1963, at Mexico City, Mexico.

Descriptors: (*Hurricane tracking, Meteorological satellites), Tropical cyclones, Infrared radiation, Aerial photographs, Radiometers, Infrared photography, Cloud cover.

Hurricane Anna is followed through its dissipating stage utilizing TIROS information and upper air data. Three orbits, two daytime (160 and 189) and one night-time (198) on July 23, 25, and 26 respectively, were used to depict the cloud characteristics over the decaying hurricane. The outflow from the hurricane at 200 mb is examined, and comparisons are made with cloud distribution as determined by the radiation data for the individual orbits. Use is made of satellite scan geometry to determine scan characteristics and their relation to cloud interpretation. (Author)

AD-428 165 Div. 2, 12
OTS price $3.60

Chicago U., Ill.
USE OF TIROS PICTURES FOR STUDIES OF THE INTERNAL STRUCTURE OF TROPICAL STORMS.
by Tetsuya Fujita and Toshimitsu Ushijima.
Oct 63, 21p. RP25
Unclassified report

Descriptors: (*Meteorological satellites, Tropical cyclones), (*Tropical cyclones, Meteorological satellites), Cumulus clouds, Storms, Photographs, Aerial photographs, Meteorological phenomena, Wind.

A series of TIROS I pictures of the South Pacific tropical storm of 10 April 1960, rectified with great accuracy, was used to study the fine structure of the storm. Three orientations of clouds-in-line were examined in an attempt to find their causes. The first orientation represents the direction of the low level winds along which small cumuli align as a cloud street. The second corresponds to the so-called hurricane rainband and probably represents a streak line when large convective towers originate at a fixed source on the earth. The plumes of cirrus from high convective towers appear as the third orientation. A theoretical study leading to the determination of cloud height from shadow on the ocean surface was also made. It was found that it is feasible to identify shadows if clouds are located over an area of ocean sunglint. (Author)

AD-428 169 Div. 2, 8
OTS price $12.00

Stanford Research Inst., Menlo Park, Calif.
SUDDEN IONOSPHERIC DISTURBANCES AND THE PROPAGATION OF VERY-LOW-FREQUENCY RADIO WAVES.
Final rept.,
by Edward T. Pierce and Helen R. Arnold. July 63, 145p.
Contract AF49 638 1081, SRI Proj. 3684
Unclassified report

Descriptors: (*Ionospheric disturbances, Propagation), (*Radio waves, Very low-frequency), Solar flares, Noise (Radio), X-rays, Cosmic rays, Ultraviolet radiation, Nuclear explosion, Electron elensity, Theory, Air burst.

The changes in VLF radio noise accompanying a solar flare and its associated sudden ionospheric disturbance (SID) are surveyed. The onset time of the effects is about 10 minutes, but may be less than 2 minutes for perhaps 5 percent of the incidents. The alteration in propagation conditions implies an increase in noise on frequencies exceeding 20 kc and a decrease below 10 kc. If a local thunderstorm develops, the time phasing is very similar to that of an SID incident, but noise at all frequencies is enhanced. A detailed examination of the formative processes of the lower ionosphere is made. Values of the rate coefficients for attachement, detachment (photo, collisional, and associative), electron-ion recombination, and ion-ion recombination, are deduced for heights from 40 to 100 km. The balance equations for the lower ionosphere are solved for the cases of equilibrium conditions and of the departure from equilibrium associated with the approach of night. Two specific examples indicate that contours of electron density, and therefore of ionospheric conductivity, are far from parallel to the surface of the earth. It follows that the attenuation coefficient for VLF propagation by day can differ according to the solar zenith angle by as much as 20% from the mean daytime value. (Author)

AD-428 170 Div. 2, 12
OTS price $4.60

Chicago U., Ill.
SYNOPTIC INTERPRETATION OF TIROS III MEASUREMENTS OF INFRARED RADIATION,
by Finn Pedersen and Tetsuya Fujita. Oct 63, 39p. RP19
Unclassified report

Descriptors: (*Infrared radiation, Measurement), (*Weather communications, Meteorological satellites), Satellites (Artificial), Radiometers, Radiation measurement systems, Weather forecasting, Cloud cover, Meteorological charts.

Infrared radiation measurements in Channels 2 and 4 for R/O 142 and 143 are used for this study. The effects of large zenith angles of the radiometer axis on the recorded radiation patterns are discussed and illustrated by means of examples. The method of Wark, Yamamoto, and Lienesch for computing outgoing total infrared flux by means of Channel 4 measurements is further developed and given a form more suitable for work on maps. This method is tested by applying it to the initial and complemental scans of one and the same general area where the measurements are separated by a time interval of only a few minutes. The method is found to give reasonable and consistent mean values for areas, each of which covers about 0.2% of the area of the total surface of the earth. (Author)

AD-428 224 Div. 2
OTS price $4.60

Naval Ordnance Test Station, China Lake, Calif.
OBSERVATIONS ON THE DISTRIBUTION OF CHEMICAL ELEMENTS IN THE TERRESTRIAL SALINE DEPOSITS OF SALINE VALLEY, CALIFORNIA,
by Oreste W. Lombardi. July 63, 42p.
NOTS TP2916 Unclassified report

Descriptors: (*Salinity, Geological survey), (*Geological survey, Rock (Geology)), Carbonate minerals, Rock salt, Geology, Soils, Stratigraphy, Faults (Geology), Minerals, Analysis, Economic geology.

Saline Valley is a deep depression in the Basin and Range Province and contains sodium chloride-sodium sulfate deposits of Pleistocene and more recent origin. The distribution of major and minor constituents in the salts, brines, muds, ground waters, and springs of the valley were investigated. Several centers of evaporation were found on the playa that contained different assemblages of major and minor constituents. Anomalous concentrations of various elements were found in the salines, some of which were traceable to source areas. Some were found to be controlled largely by clay minerals. The alkaline earths are quantitatively precipitated, from ground waters containing an excess of carbonate over alkaline earths, as carbonates along the playa margin leaving some substances to concentrate in the centers of evaporation. Many of the trace elements in the brines were found to be related to or controlled by the ratio of alkaline earths to carbonate or bicarbonate in the incoming ground water. (Author)

AD-428 252 Div. 2, 8
OTS price $10.10

Texas A. and M. Coll., College Station.
AN INVESTIGATION OF PRECIPITATION ATTENUATION AND ITS APPLICATION IN A DUAL-FREQUENCY RADAR MORPHOLOGY OF SUBTROPICAL PRECIPITATION,
by Douglas Richard Greene. Jan 64, 109p.
Unclassified report

Master's thesis.

Descriptors: (*Atmospheric precipitation, Attenuation), (*Radar interference, Atmospheric precipitation), Rainfall, Raindrops, Meteorological radar, Mathematical analysis, Absorption, Hail.

An indication of the magnitude of precipitation attenuation may be obtained by observation of a single, convective, precipitation echo with a dual-frequency radar system. The applicability of this attenuation in the study of convective liquid precipitation is investigated. The attenuation factor is calculated by use of the rigorous Mie solution for the total attenuation cross section and the Marshall-and-Palmer drop-size distribution. The attenuation factor is related to rainfall rate and liquid-water content. Analysis reveals that the in-cloud vertical velocity field must be known in order to relate the attenuation factor to rainfall rate. The problem of forward scattering by both solid and liquid precipitation is examined. For small, liquid-water drops, the amount of forward scattered energy is insignificant; however, for large ice particles, forward scattering becomes important. (Author)

AD-428 266 Div. 2
OTS price $2.60

Space Sciences Lab., U. of Calif., Berkeley.
MAGNETOTELLURIC EVIDENCE FOR THE LOW VELOCITY LAYER,
by H. G. Fournier, S. H. Ward and H. F. Morrison. 7 Nov 63, 23p. Rept. no. S4; I76
Contract Nonr22289
Unclassified report

Descriptors: (*Resistance (Electrical), Lithosphere), Electric currents, Terrestrial magnetism.

The most complete soundings indicate a sharp decrease in electrical resistivity from about 10,000 ohm meters to about 50 ohm meters at a depth of the order of 70-80 km in the Earth. The soundings suggest that the resistivity increases again shortly thereafter to 1000 ohm meters and then finally decreases to 1 ohm meter at a depth which seems to vary from 300 to 1000 km. Using four and five layer models of the Crust and Mantle, families of theoretical magnetotelluric sounding curves are computed. From these families of theoretical curves, two curves which seem to be most representative of the average characteristics of the observed curves are found. (Author)

AD-428 269 Div. 2, 12, 24
OTS price $2.60

Weather Bureau, Washington, D. C.
THE USE OF SATELLITE CLOUD PHOTOGRAPHS IN NUMERICAL WEATHER PREDICTION.
by Mary Ann Ruzecki. Dec 63, 22p.
WB DC MSLR23 Unclassified report

Descriptors: (*Meteorological satellites, Weather forecasting). (*Clouds, Photographic analysis). Cloud height indicators, Mathematical models, Numerical methods and procedures, Mathematical prediction, Mathematical analysis, Vortices, Precipitation, Temperature, Computers, Programming (Computers). Aerial photography.

This report describes an alternate approach in which TIROS cloud photographs and nephanalyses are used to modify, in sparse data areas, the stream function field which had been objectively analyzed. The modified analysis is used in the numerical prediction models to compute new height prognoses. The prognoses are then tested to see whether or not an improvement has been made. A case study is described in which this method of reanalysis is utilized. As more sophisticated satellites are launched the coverage of sparse data areas will be much more frequent and complete. It is conceivable that the use of satellite information will become a daily synoptic task. (Author)

AD-428 326 Div. 2
OTS price $2.60

Aerospace Information Div., Washington, D. C.
GEOPHYSICAL PROSPECTING AND EXPLORATION METHODS ON THE USE OF PERFORATED MATERIALS IN TWO-DIMENSIONAL SEISMIC MODELING.
16 Jan 64, 26p.
AID T64 2 Unclassified report

Trans. from Izvestiya vysshikh uchebnykh zavedeniy. Geologiya i razvedka, No. 1, pp. 139-156, 1960.

Descriptors: (*Seismic waves, Model tests), Geophysics, Exploration, Materials, Ultrasonic radiation, Dynamics, Elasticity, Mechanical waves, Solids, Propagation, Liquids, Density, Distribution, Reliability, Bonding, Acoustics.

AD-428 332 Div. 2, 25, 13
OTS price $3.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
STATIC AND DYNAMIC PLATE-BEARING TESTS ON DRY SAND WITHOUT OVERBURDEN,
by Charles R. White. 14 Jan 64, 36p.
Proj. Y F008 08 03 402
NCEL TR R277; DASA 13018 Unclassified report

Descriptors: (*Soil mechanics, Nuclear explosions), Soils, Radiation damage, Underground structures, Sand, Shelters, Simulation, Physical properties.

The NCEL atomic blast simulator is intended for testing beams, beam-column connections, and other relatively narrow structural elements. This report describes the successful adaptation of the simulator for providing dynamic loads on a bearing plate on sand and presents some tentative results. The dynamic bearing capacity of a 15-in.-diameter bearing plate on dry sand without overburden was 90% higher than the static bearing capacity. Also, the dynamic bearing modulus was considerably higher than the static; e.g., 226 psi per in. dynamic versus 137.7 psi per in. static at 0.5 in. plate settlement. (Author)

AD-428 370 Div. 2
OTS price $1.10

High Altitude Observatory, Boulder, Colo.
INTEGRATED INDICES OF THE SOLAR CORONA, 1962,
by Dorothy E. Trotter. 15 July 63, 7p. Rept. no. HA058
Unclassified report

Descriptors: (*Solar corona, Line spectrum), Solar spectrum, Solar atmosphere, Tables.

Coronal spectra taken at the solar limb are made at the Climax Station of the High Altitude Observatory, the Sacramento Peak Observatory at Sunspot, New Mexico, Pic du Midi in France, and the Kislovodsk Station of the Pulkovo Observatory in Russia. These four stations express the

line intensity of the lambda 5303 and lambda 6374 emission lines in terms of the brightness of the center of the solar disk. The values thus obtained are in good internal agreement, and taken together provide sufficient data for us to compute a reliable day-to-day quadrant index as explained below. (Author)

AD-428 372 Div. 2, 22
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT. AEROBEE AD 3.324,
by Gordon L. Dunaway. Dec 63, 39p.
DA Task 1G6 50212A127 02
AERDA 101 Unclassified report

Descriptors: (*Sounding rockets, Meteorology) (*Meteorology, Sounding rockets), Ballistics, Wind, Velocity, Temperature, Pressure, Humidity, Data, Data processing systems.

Meteorological data gathered for the launching of Aerobee AD 3.324 are presented for the Air Force Cambridge Research Center and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D. (Author)

AD-428 373 Div. 2, 22
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT. AEROBEE NE 3.153,
by Gordon L. Dunaway. Dec 63, 41p.
DA Task 1G6 50212A127 02
AERDA 102 Unclassified report

Descriptors: (*Sounding rockets, Meteorology), (*Meteorology, Sounding rockets), Ballistics, Wind, Velocity, Temperature, Pressure, Humidity, Data, Data processing systems.

Meteorological data gathered for the launching of Aerobee NE 3.153 are presented for the U. S. Naval Research Laboratory and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D. (Author)

AD-428 392 Div. 2, 25
OTS price $1.10

New Mexico State U., Las Cruces.
PLANETARY AND LUNAR RESEARCH IN THE PHOTOGRAPHIC INFRARED, VISIBLE AND ULTRAVIOLET.
Semi-annual rept. no. 5, 1 Apr-30 Sep 63,
by Clyde W. Tombaugh. Oct 63, 12p.
Grant DA ARO D31 124G41
Unclassified report

Descriptors: (*Planets, Spectroscopy), Spectrum analyzers, Spectra (Infrared), Spectra (Visible and ultraviolet), Ultraviolet spectrophotometers, Ultraviolet radiation, Telescopes, Asteroids, Photographic analysis, Infrared radiation, Infrared spectrophotometers.

AD-428 428 Div. 2
OTS price $4.60

Space Sciences Lab., U. of Calif., Berkeley.
GEOMAGNETIC BAYS - A REVIEW,
by Ruben Zelwer. 3 Dec 63, 1v. Rept. no. S4 I86
Contract Nonr222 89
Unclassified report

Descriptors: (*Magnetic storms, Reviews), Terrestrial magnetism, Storms.

AD-428 433 Div. 2
OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
THEORETICAL CONSIDERATIONS OF SHEAR DEFORMATION IN ROCKS,
by K. E. Seifert, R. E. Riecker and L. C. Towle.
Dec 63, 31p.
Proj. 8652
AFCRL 63 934 Unclassified report

Descriptors: (*Rock (Geology), Deformation), (*Deformation, Shear stresses), Pressure, Temperature, Anisotropy, Strain (Mechanics), Crystal structure, Failure (Mechanics), Materials, High-temperature research, High pressure research, Recrystallization, Ductility.

Strength of rock material depends on pressure, temperature, rate and duration of stress application, type of stress, solutions, anisotropy, past strain history, crystal perfection and composition. Failure of materials at high temperatures and pressures occurs by uniform flow, which involves the four distinct mechanisms of translation gliding, twin gliding, recrystallization and cataclasis. Increases in temperature, pressure and the presence of solutions favor translation gliding, twin gliding and recrystallization, whereas low temperatures and pressures favor cataclasis. The AFCRL experimental rock deformation program yields data on the behavior of rock materials of lower crust-upper mantle composition under geophysically realistic conditions of high pressure and temperature. Experimental variables, temperature, pressure and rate of strain, are derived from calibration equations based on observable physical variables. Mechanical behavior of the samples adduces in terms of two physical models; the Coulomb-Navier substance expressing brittle behavior and the Bingham substance expressing ductile behavior. The nature of failure in shear experiments yields information on the origin of deep earthquakes, and the catalytic effect of shearing stresses may induce new high pressure polymorphs. (Author)

AD-428 436 Div. 2
OTS price 16.00

Hanford Atomic Products Operation, Richland, Wash.
THE OCEAN BREEZE AND DRY GULCH DIFFUSION PROGRAMS, VOLUME 1,
by Duane A. Haugen and James J. Fuquay. Nov 63, 240p. Document no. HW78435.
AFCRL 63 791 vol. 1 Unclassified report

Cooperation with Hanford Atomic Products Operation, Richland, Wash.

Descriptors: (*Guided missile safty, Diffusion), Guided missile ranges, Meteorological phenomena, Data, Air mass analysis, Data processing systems, Air pollution Meteorological instruments, Micrometeorology.

Field Diffusion programs were conducted at Cape Canaveral, Florida and Vandenberg AFB, California during 1961 and 1962. These programs, nicknamed Ocean Breeze and Dry Gulch respectively, were undertaken to establish quantitative diffusion predictions for use as range safty tools at the missile test ranges. The programs culminated at each range with the installation of an automatic computer-controlled meteorological data acquisition and processing system now in continuous operation at the bases. These systems have been named Weather Information Network Display (WIND) systems. Volume I describes the diffusion experiments that were

conducted as well as summaries of the resulting experimantal data. Volume II is devoted to analyses of the data to develop diffusion prediction equations, description of the WIND systems, recommendations for operational use of the prediction equation and WIND systems, and preliminary climatological summaries for each missile test range. (Author)

AD-428 447 Div. 2, 12
OTS price $2.60

Chicago U., Ill.
EVALUATION OF LIMB DARKENING FROM TIROS III RADIATION DATA,
by S. H. H. Larsen, T. Fujita and W. L. Fletcher. Aug 63, 19p. Research paper no. 18
Grants NASA NSG333, WBG6
Unclassified report

Descriptors: (*Radiation measurement systems, Meteorological satellites), Albedo (Astronomy), Deserts, Radiometers, Scanning, Weather communications.

Detailed analyses of radiation data over the Sahara desert, using analog traces (brush records) of the medium resolution, five-channel radiometer on TIROS III, were made in an attempt to evaluate the limb darkening (variation in intensity of outgoing radiation with the direction of propagation). In the technique employed use was made of the fact that some areas on the earth are scanned twice by the radiometer beam within a few minutes interval as the satellite spins and progresses along its path. Pairs of measurements, where the satellite's radiometer views the same point at a large and a small zenith angle, were combined, and from such measurements a substantial limb darkening was found. Serious influences on the radiation data may occur as a consequence of the scan geometry; these have been carefully examined and taken into account in the interpretation of the data. (Author)

AD-428 471 Div. 2
OTS price $11.50

Air Force Cambridge Research Labs., Bedford, Mass.
BIBLIOGRAPHY OF LUNAR AND PLANETARY RESEARCH-1962,
by J. W. Salisbury, R. A. Van Tassel, J. E. M. Adler and R. T. Dodd, Jr. Dec 63, 1v.
Proj. 8602
AFCRL 63 903 Unclassified report

Descriptors: (*Astrophysics, Bibliographies), Astronomy, Comets, Lunar probes, Meteorites, Moon, Solar systems, Planets, Research program administration, Magnetic fields, Lunar environment.

A bibliography of lunar and planetary research articles published in 1962 is presented with both subject and author entries. The subject listings, which are abstracted, fall into the following major categories: astrobiology, comets, exploration programs and probes, meteorite craters and cratering effects, meteors and meteorites, the moon, origin of the solar system, the planets, and tektites. (Author)

AD-428 482 Div. 2, 13
OTS price $3.60

Bureau of Reclamation, Denver, Colo.
EXAMINATION OF LIMESTONE ROCK CORES YELLOWTAIL DAMSITE TUNNELS, MISSOURI RIVER BASIN, MONTANA,
by S. Rubenstein. 14 June 63, 1v.
BR D LR PET 132 Unclassified report

Descriptors: (*Limestone, Rock (Geology)), Drilling machines, Drills, Petrology.

AD-428 493 Div. 2
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
TRAPPED PROTONS AT LOW ALTITUDES IN THE SOUTH ATLANTIC MAGNETIC ANOMALY,
by S. C. Freden and G. A. Paulikas. 16 Dec 63, 26p. Rept. no. TDR269 4260 20 1
Contract AF04 695 269
SSD TDR63 342 Unclassified report

Descriptors: (*Protons, Magnetic fields), Terrestial magnetism, Albedo (Astronomy), Scientific satellites, Instrumentation, Spectrophotometers, Low altitude.

The fluxes of protons from 5 to 20 Mev and 60 to 120 Mev were measured in September and October, 1962, at low altitudes over the South Atlantic magnetic anomaly. The ratio of the fluxes in these two energy intervals is essentially independent of B and is independent of L below $L \simeq 1.4$ but changes rapidly for $L > 1.4$. The flux in the 5- to 20-Mev interval indicates that the spectrum turns back up below the local minimum (at $L \leq 1.5$) near 20 Mev. This result is consistent with an increased absorption in the atmosphere for the albedo neutrons near 20 Mev. The integral flux above 31 Mev appears to have increased by a factor of about 3 at the lower L values and higher B values since the Explorer IV measurements. (Author)

AD-428 516 Div. 2
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
A STUDY OF THE DYNAMICS AND CLIMATOLOGY OF COLD OUTBREAKS IN THE FAR EAST,
by K. Suta. 14 Jan 64, 17p.
RSIC 120 Unclassified report

Trans. from Jnl. of Meteorological Research, vol. 10: pp. 1053-1060, 1958.

Descriptors: (*Climatology, Atmospheric motion), Barometric pressure, Temperature, Surface temperatures, Oceans, Air mass analysis, Surface properties, Periodic variations, Meteorological charts, Meteorology, Atmospheric temperature, Ocean currents, Cooling.

An attempt was made to clarify the pattern of currents accompanying a pressure system with a high in the West and a low in the East and the mechanism of a cold outbreak by analyzing weather maps covering a large area. The data used was the five-day average weather map of the northern hemisphere issued by the Division of Forecasting of the Bureau of Meteorology and the Institute of Meteorology. (Author)

AD-428 517 Div. 2, 13
OTS price $14.00

Bureau of Reclamation, Denver, Colo.
LABORATORY STUDIES FOR FINAL DESIGN ON DAM FOUNDATION AND EMBANKMENT SOILS--NORMAN DAM--NORMAN PROJECT--OKLAHOMA,
Comp. by W. Ellis. 12 July 63, 152p.
BR D LR EM669 Unclassified report

Descriptors: (*Soils, Dams), (*Dams, Soils), Foundations (Structures), Clay, Classification, Shear stresses, Tables, Sand, Moisture, Density, Cements, Silt.

Previous investigations of the alluvial deposits in the area of the valley floor at the Norman damsite indicated that the lower half of the deposit contained orgaic silts and clays. This investigation consisted of performing vane shear tests in one test hole and obtaining 5-in-dia fixed piston samples in a second test hole. The two holes were drilled approximately 10 ft. apart. The laboratory testing of the undisturbed piston samples included visual classification of the soils. The dinsity, moisture content, and Atterberg limits of the undisturbed samples were determined. Triaxial shear tests were performed using both sealed and fully drained tests on undisturbed soils, and drained tests on these same soils remolded at 0% relative consistency (liquid limit), then anisotropically consolidated to 63% relative consistency prior to shear testing. The purpose was to provide shear constants which represented a wide range of in-place soil moisture and density conditions. Proctor compaction and relative density tests were performed. Samples were also used for triaxial shear and one-demensional and floating ring consolidation tests. One sample of shale fragments was tested to determine the particle breakdown with compaction and the change in penetration resistance of the compacted fragments with wetting. One sample, representing a silty sand, was tested to give a preliminary evaluation of the cement content for the proposed soil-cement dam facing. (Author)

AD-428 604 Div. 2
OTS price $8.60

Travelers Research Center, Inc., Hartford, Conn.
THEORETICAL AND SYNOPTIC STUDIES OF LOW-LEVEL TROPICAL PERTURBATIONS.
Final rept.,
by Geirmundur Arnason, Keith D. Hage and George M. Howe. Oct 63, 87p. Rept. no. 7051 97
Contract Cwb10499 Unclassified report

Descriptors: (*Atmospheric motion, Tropical regions), (*Meteorology, Atmospheric motion), Wind, Meteorological charts, Convection, Barometric pressure, Theory, Stability, Perturbation theory, Atmosphere models, Mathematical models, Troposphere, Tropical cyclones.

The theoretical part of this study deals with (a) the effect of a variable Coriolis parameter on the propagation and growth of small perturbations in a uniformly moving, statically unstable atmosphere and (b) the stability properties of small perturbations in a statically unstable baroclinic zonal flow. A variable Coriolis parameter results in (a) speeds of propagation that, depending on static stability and latitude, may be either westward or eastward relative to the basic flow and (b) an increase in scale of marginally unstable perturbations. Perturbations that develop in a statically unstable baroclinic flow are much larger than those that develop in a uniformly moving atmosphere and range from a few hundreds to a few thousands of kilometers. Short waves, unstable in a resting atmosphere, appear unable to feed on the potential energy of a basic flow. The synoptic part of this study, still incomplete, deals with a modestly intense low-level perturbation. Tentative results show it to be imbedded in a conditionally unstable, slightly baroclinic easterly flow, to have a wavelength of about 1600 km, and to be moving faster than the flow in which it is embedded. The ratio of its greatest horizontal wind divergence to its greatest relative vorticity is about 0.5. (Author)

AD-428 605 Div. 2, 25
OTS price $2.60

Space Sciences Lab., U. of Calif., Berkeley.
THE STATE OF MAGNETO-TELLURICS IN THE SOVIET UNION,
by Gottfried Porstendorfer, tr.by H. F. Morrison.
3 Dec 63, 21p. S4, I85
Contract Nonr222 89 Unclassified report

Trans. from Der Stand der Magneto---Tellurik in der Sowjetunion Bergakademie 3, pp. 235-242, 1963.

Descriptors: (*Geophysical prospecting, Magnetic fields), (*Earth, Terrestrial magnetism), Electrical impedance, Resistance (Electrical), Electric fields, Electromagnetic waves, Polarization, Anisotropy, Harmonic analysis, Alternating current.

AD-428 613 Div. 2, 13
OTS price $3.60

Bureau of Reclamation, Denver, Colo.
RESEARCH ON COMPACTION CONTROL TESTING FOR GRAVELLY SOILS EARTH RESEARCH PROGRAM,
comp. by J. Merriman and W. N. Houston.
8 Aug 63, 30p.
BR D EM662 Unclassified report

Descriptors: (*Soils, Gravimetric analysis), (*Gravel, Soils), Density, Weight, Clay, Sand, Dams, Tables, Foundations (Structures).

Compaction characteristics were made of soils containing gravel in amounts varying from 0 to 50 percent by weight of the total material. The purpose was to obtain data for studying the compaction characteristics of gravelly soils. Three methods are given for calculating the density of the fine fraction in a gravelly soil. A method for controlling the compaction of gravelly soils is suggested. This method involves the use of a correction factor. (Author)

AD-428 618 Div. 2, 22
OTS price $3.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT, AEROBEE AC 3.511,
by Marjorie McLardie Hoidale. Sep 63, 34p.
Task 1G6 50212A127 02
AERDA 69 Unclassified report

Descriptors: (*Sounding rockets, Rocket trajectories), Meteorological parameters, Mathematical prediction, Circular error probable, Wind, Meteorological balloons, Computers, Theodolites, Velocity, Height finding, Ballistics, Meteorological charts, Temperature, Pressure, Humidity, Data processing systems, Radar tracking, Theory, Data transmission systems, Tables, Launching.

Aerobee AC 3.511 was launched from White Sands Missile Range on 10 July 1963. Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, U. S. Army Electronics Research and Development Activity (Author)

AD-428 619 Div. 2, 22
OTS price $3.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT, LITTLE JOE II, QTV-1,

by Gordon L. Dunaway. Oct 63, 30p.
Task 1G6 50212A127 02
AERDA 84 Unclassified report

Descriptors: (*Sounding rockets, Rocket trajectories), (*Launch vehicles (Aerospace), Sounding rockets), Meteorological parameters, Mathematical prediction, Circular error probable, Wind, Meteorological balloons, Computers, Theodolites, Velocity, Height finding, Ballistics, Meteorological charts, Temperature, Pressure, Humidity, Data processing systems, Radar tracking, Theory, Data transmission systems, Tables, Launching.

Little Joe II, QTV-1, was launched from Army Launch Area Three on 28 August 1963. Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, U. S. Army Electronics Research and Development Activity. (Author)

AD-428 620 Div. 2, 22
OTS price $3.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT,
by Marjorie McLardie Hoidale. Nov 63, 33p.
DA Task 1G6 50212A127 02
AERDA 90 Unclassified report

Descriptors: (*Sounding rockets, Rocket trajectories), Meteorological parameters, Mathematical prediction, Circular error probable, Wind, Meteorological balloons, Computers, Theodolites, Velocity, Height finding, Ballistics, Meteorological charts, Temperature, Pressure, Humidity, Data processing systems, Radar tracking, Theory, Data transmission systems, Tables, Launching.

Aerobee BSRA-02 was launched from White Sands Missile Range on 10 September 1963. Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, U. S. Army Electronics Research and Development Activity. (Author)

AD-428 621 Div. 2, 22
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT, AEROBEE NE 3.151,
by Marjorie McLardie Hoidale. Nov 63, 41p.
Task 1G6 50212A127 02
AERDA 91 Unclassified report

Descriptors: (*Sounding rockets, Rocket trajectories), Meteorological parameters, Mathematical prediction, Circular error probable, Wind, Meteorological balloons, Computers, Theodolites, Velocity, Height finding, Ballistics, Meteorological charts, Temperature, Pressure, Humidity, Data processing systems, Radar tracking, Theory, Data transmission systems, Tables, Launching.

Aerobee NE 3.151 was launched from White Sands Missile Range on 20 September 1963. Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, U. S. Army Electronics Research and Development Activity. (Author)

AD-428 715 Div. 2, 13
OTS price $11.50

Bureau of Reclamation, Denver, Colo.
CHEMICAL GROUTING INVESTIGATIONS ON NAVAJO SANDSTONE GLEN CANYON DAM--COLORADO RIVER STORAGE PROJECT.
30 Oct 63, 1v.
BR D LR C1064 Unclassified report

Descriptors: (*Sandstone, Sealing compounds), (*Sealing compounds, Sandstone), (*Dams, Foundations (Structures)), Water, Chemical analysis, Solutions, Geochemistry, Organic materials, Plastics, Silicon compounds, Colloids, Lignin, Asphalt, Aluminates, Phenolic plastics, Penetration, Gels, Chemical reactions, Photographs, Elasticity, Compressive properties, Petrology, Clay, Permeability, Chemical properties.

Glen Canyon Dam is founded in the relatively pervious Navajo sandstone geological formation. Although flows from drain holes drilled during construction of the dam are somewhat less than anticipated in the designs, the wide variation of permeability of the sandstone as determined by laboratory tests indicated a possibility of higher than expected flows through localized zones higher in the abutments. Since the capabilities of several chemical grouts as sealants in this type of rock had not been previously evaluated by testing procedures, a laboratory program was initiated. Several types of grouts were investigated, and tests, results, and conclusions derived from laboratory work are presented. The grout field trials which were initiated at the conclusion of the laboratory investigations are also presented. Results of chemical, petrographic, and physical investigations on the natural and chemically grouted Navajo sandstone core drill samples will be presented in a supplementary report. (Author)

AD-428 759 Div. 2
OTS price $1.10

American U., Washington, D. C.
THIS REPORT IS A PILOT STUDY AIMED AT A COORDINATED INVESTIGATION OF THE RELATIONSHIPS BETWEEN THE GEOCHEMISTRY OF THE SUBSTRATE AND THE BENTHONIC BIOTA IN THE CHESAPEAKE BAY AREA.
Final rept.,
by Matthew F. Norton. 30 Jan 64, 7p.
Grant Nonr G00024 61, Proj. NR104 631
Unclassified report

Descriptors: (*Geochemistry, Estuaries), (*Sedimentation, Marine biology), Clay minerals, X-ray diffraction analysis, Particle size, Sampling, Ecology.

AD-428 784 Div. 2
OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
HEAT FLUX AND SURFACE STRESS ON AND NEAR AN ISLAND IN THE TRADE WIND REGION.
Semi-annual progress rept. no. 3, 15 July-5 Dec 63,
by E. B. Kraus. 5 Dec 63, 14p. Ref. no. 63 46
Contract DA36 039sc90784
Unclassified report

Descriptors: (*Meteorological instruments, Meteorological parameters), (*Wind, Measurement), (*Heat, Surfaces), Temperature, Anemometers, Stresses, Tests, Research program administration.

The objectives of this project are (1) to elucidate the effect of sea surface conditions on the vertical flux of heat and momentum; and (2) to establish relationships between a variable irradiation, heat flux and land surface temperatures. Some research programs, related to the present project, are described. Scientists planning to take part in the forthcoming Aruba expedition are listed. New technical developments under the contract, modifications or improvements of existing equipment and the thorough testing program which occupied most of our attention are described. (Author)

AD-428 804 Div. 2
OTS price $4.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
IONOSPHERIC RESEARCH.
Final rept., 1 Oct 58-31 Oct 63,
by A. H. Waynick. 30 Nov 63, 44p.
Contract AF19 604 4563, Proj. 8605, Task 860502
AFCRL 63 931 Unclassified report

Descriptors: (*Ionosphere, Scientific research), Low frequency, Measurements, Absorption, Polarization, Electromagnetic waves, Theory, Solar atmosphere, Upper atmosphere, Dynamics, Analysis, Rockets, Satellites (Artificial), Diffraction, Antennas.

AD-428 805 Div. 2
OTS price $5.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION 2.75 INCH TRAINING ROCKET LAUNCHER.
Jan 64, 1v.
TAC TR63 30 Unclassified report

Descriptors: (*Rocket launchers, Performance (Engineering)), (*Training devices, Pilots), Airborne, Adapters, Sights, Operation, Flight testing, Human engineering, Firing tests (Ordnance), Jet fighters.

Rocket firing training could not be provided for the initial F-4 pilot classes in Course No. 111507F because of the temporary non-availability of 2.75 in. rocket launchers. The 2.75 in. Training Rocket Launcher was developed and tested by the 4453rd Combat Crew Training Squadron and F-4C Operational Engineering Division. The interim launcher consisted of MA-2A rocket tubes attached to a modified MA-3 Adapter. Flight testing was satisfactory and resonable rocket firing accuracy was obtained. Loading, checkout, and pilot checklists were developed. It was observed that the present F-4B sight is unstable and that pilot acquisition of the sight aim dot is difficult at zero or small depression settings. The test aircraft intervelometer was found to be unreliable. (Author)

AD-428 953 Div. 2
OTS price $1.60

Space Sciences Lab., U. of Calif., Berkeley.
COHERENCY OF GEOELECTROMAGNETIC SIGNALS.
by S. H. Ward and H. G. Fournier. 6 Nov 63,
16p. Se4; I72
Contract Nonr222 89
Unclassified report

Descriptors: (*Terrestrial magnetism, Geophysics), Magnetic fields, Electric fields, Anisotropy.

By theory and observation it is possible to demonstrate that the coherency between orthogonal electric and magnetic time series used in magnetotelluric sounding is a function of (1) the direction of the measuring axes, (2) the anisotropy ratio, (3) the coherency between the orthogonal H components, (4) the relative magnitudes of the orthogonal H components, and (5) the frequency. Similarly, the coherency between orthogonal electric time series measured in a telluric survey is a function of many variables including all five items listed. Experimental data is presented which illustrates the dependence of coherency on the direction of the resultant telluric vector. The mentioned coherencies can change over relatively short periods of time and when they reach low values, the reliability of either of the magnetotelluric or telluric methods is apt to be reduced. (Author)

AD-428 955 Div. 2
OTS price $4.60

National Engineering Science Co., Pasadena, Calif.
THEORETICAL INVESTIGATION OF SEMI-INFINITE ICE FLOES IN WATER OF INFINITE DEPTH.
Final rept.,
by James A. Hendrickson and Lois M. Webb.
June 63, 43p. Rept. no. P457SN113
Contract NBy32225
Unclassified report

Descriptors: (*Ice islands, Water waves), Stresses, Elasticity, Equations, Numerical methods and procedures, Partial differential equations, Mechanical waves, Civil engineering, Theory.

The response of semi-infinite ice floes to water waves is analyzed for relatively deep water. If the floe submergence is neglected it is found that a progressive wave is transmitted. The stress produced by this transmitted wave is determined for various floe thicknesses and incident wave lengths. When the submergence is not neglected it is necessary to use a finite difference approach to the solution. Such a solution is attempted and the results and accompanying numerical problems are considered in detail. (Author)

AD-428 958 Div. 2, 13
OTS price $3.60

Bureau of Reclamation, Denver, Colo.
CANAL BANK EROSION BY SURFACE WATER WAVES GENERATED IN A LABORATORY FLUME,
by R. A. Dodge, Jr. 11 June 63, 16p.
BR D HYD506 Unclassified report

Descriptors: (*Water waves, Erosion), (*Inland waterways, Erosion), Soils, Compatibility, Wind, Tests, Test equipment, Inland waterways, Density, Physical properties, Gravity.

Studies were made to determine the erosive effect of gravity water waves on earth material obtained from the Kennewick Main Canal, Yakima Project, Washington. The soil is classified as a fine silt having practically no cohesive qualities. Three placements of the soil were made in a side-slope test section of a canal represented in a wave flume. Each placement received the same kind and degree of compaction but was subjected to the action of a different wave produced by a wave generator. The amount of bank erosion was measured and the relationship of the volume of eroded soil was determined with respect to wave length, wave period, wave height, and the time of exposure to waves. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-428 963 Div. 2, 25
OTS price $1.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
RESEARCH ON PHYSICS OF THE IONOSPHERE.
Final rept.,
by Sidney Borowitz. 30 Nov 63, 4p.
Contract AF19 604 4555, Proj. 7635, Task 763507
AFCRL 63 925 Unclassified report

Descriptors: (*Ionosphere, Atomic structure), (*Atomic structure, Ionosphere), Scattering, Theory, Perturbation, Theory, Electrons, Ions, Equations, Correction, Models (Simulations), Nuclei, Phase shifters, Momentum.

AD-429 020 Div. 2, 30
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT AEROBEE NE 3.129,
by Marjorie McLardie Hoidale. Oct 63, 37p.
Task 1G6 50212A127 02
AERDA 80 Unclassified report

Descriptors: (*Meteorological charts, Wind), Rocket trajectories, Anemometers, Wind direction indicators, Sounding rockets, Performance (Engineering), Meteorological balloons, Theodolites, Pressure, Humidity, Refractive index, Data.

Meteorological data gathered for the launching of Aerobee NE 3.129 are presented for the U. S. Naval Research Laboratory and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D. (Author)

AD-429 021 Div. 2, 30
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT AEROBEE AD 3.374 (AF-108),
by Marjorie McLardie Hoidale. Oct 63, 41p.
Task 1G6 50212A127 02
AERDA 86 Unclassified report

Descriptors: (*Meteorological charts, Wind), Sounding rockets, Performance (Engineering), Rocket trajectories, Anemometers, Wind direction indicators, Atmospheric temperature, Pressure, Humidity, Refractive index, Data.

Meteorological data gathered for the launching of Aerobee AD 3.374 (AF-108) are presented for the Air Force Cambridge Research Center and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D. (Author)

AD-429 022 Div. 2, 30
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT AEROBEE AD 3.151,
by Marjorie McLardie Hoidale. Nov 63, 43p.
Task 1G6 50212A127 02
AERDA 92 Unclassified report

Descriptors: (*Meteorological charts, Wind), Sounding rockets, Performance (Engineering), Rocket trajectories, Anemometers, Wind direction indicators, Atmospheric temperature, Pressure, Humidity, Refractive index, Data.

Meteorological data gathered for the launching of Aerobee AD 3.151 are presented for the U. S. Naval Research Laboratory and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D. (Author)

AD-429 080 Div. 2, 25
OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
POLAR MAGNETIC DISTURBANCES,
by B. E. Brunelli. 26 Sep 63, 45p.
FTD MT63 48 Unclassified report

Trans. from Geomagnetizm I Aeronomiya, 2:5, pp. 801-821, 1962.

Descriptors: (*Magnetic storms, Polar regions), Aurorae, Ionospheric disturbance, Radiofrequency interference, Terrestrial magnetism, Charged particles, Electrical conductance.

AD-429 108 Div. 2
OTS price $1.60

RAND Corp., Santa Monica, Calif.
METEOROID CONCENTRATION BY THE EARTH'S GRAVITATIONAL FIELD,
by S. H. Dole. Jan 64, 12p. Rept. no. P2832
Unclassified report

Descriptors: (*Meteors, Simulation), Space environmental conditions, Orbital trajectories, Gravity, Mathematical models, Astrophysics, Earth models, Programming (Computers).

In a series of computer runs, a number of low-velocity particles in three-dimensional space were released in the vicinity of (1) the Earth in its orbit around the Sun, and (2) an Earth isolated in space, and the particles' positions were then traced through space. The subsequent steady-state concentration of particles around the Earth for (1) was found to be proportional approximately to the -1 power of the distance from the center of the Earth, while for (2) the -0.68 ± 0.14 power of the distance from the center of the Earth (theoretical value: -0.50). It is concluded that there is a significant difference in the gravitational concentration of particles around the Earth in orbit around the Sun as compared with an isolated Earth. In the real world, low-velocity particles are gravitationally concentrated by the Earth much more than one would expect from looking at a simple model of an isolated Earth. (Author)

AD-429 110 Div. 2
OTS price $5.60

RAND Corp., Santa Monica, Calif.
SOLAR SYSTEM SCIENCE BIBLIOGRAPHIES,
by Edna O'Connell. Jan 64, 46p. Rept. no. P2859
Unclassified report

Descriptors: (*Solar systems, Bibliographies), Planets, Moon, Astrophysics, Astronomy.

This is a bibliography of bibliographies of solar system science. It covers the period 1961 to the present. (Author)

AD-429 187 Div. 2, 25
OTS price $4.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
IONOSPHERIC RESEARCH.

Final rept., 1 Apr 61-31 July 63,
by A. J. Ferraro and J. S. Nisbet. 31 Aug 63,
41p.
Contract AF19 604 8012, Proj. 7663, Task 766301
AFCRL 63 924 Unclassified report

Descriptors: (*Ionospheric propagation, Rockets), (*Probes (Electromagnetic), Electromagnetic waves), Low frequency, Abstracts, Bibliographies, Research program administration.

The investigation of the structure and variations of the lower ionosphere by extending the normal ionosonde sweep frequency technique into the low frequency range and investigation of ionospheric parameters by means of a conductivity rocket probe is reported. The problems outlined fit under the broad categories of recording programs, electromagnetic theory studies, ionospheric phenomena, ground based and rocket equipment development and the physics of ionospheric formation. A listing of the reports issued and in preparation, paper publication and presentation and similar matters are also presented. (Author)

AD-429 280 Div. 2, 12
OTS price $2.60

Naval Research Lab., Washington, D. C.
SATELLITE-TRACKED HORIZONTAL SOUNDING SYSTEM,
by H. J. Mastenbrook and H. D. Cubbage. Feb 62,
22p.
NRL MR1277 Unclassified report

Descriptors: (*Meteorological balloons, Radiosondes), (*Meteorological satellites, Weather forecasting), Meteorology, Collecting methods, Atmospheric motion, Power supplies, Radio communication systems, Weather communications.

The Transosonde and the Meteorological Satellite might be combined to form a single system which would incorporate the merits of each, without their respective shortcomings. As conceived, the meteorological satellite would be used to position a global distribution of constant level balloons within the atmosphere to sense the atmospheric motion on a global scale. The observation of the field of motion would be in addition to the observation of cloud cover and radiation from the satellite. The feasibility of the combined system has been considered and found to be entirely within present-day technological capabilities. (Author)

AD-429 288 Div. 2, 12
OTS price $10.10

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
ATMOSPHERIC STRUCTURE WHITE SANDS MISSILE RANGE, NEW MEXICO. PART 2. TEMPERATURE, RELATIVE HUMIDITY, DEW POINT, STATION PRESSURE, DENSITY, CLOUDS, HYDROMETEORS, AND LITHOMETEORS,
by Marjorie McLardie Hoidale. Jan 64, 116p.
DA Task 1G6 50212A127 02
AERDA 106 Unclassified report

Descriptors: (*Guided missile ranges, Meteorological parameters), (*Meteorological parameters, Guided missile ranges), Atmospheric temperature, Humidity, Dew point, Barometric pressure, Density, Clouds, Periodic variations, Statistical analysis, Atmospheric precipitation, Statistical data.

A statistical analysis of exoteric meteorological data is presented for 'A' Station, White Sands Missile Range, New Mexico. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-428 603 Div. 3, 28
OTS price $13.50

Indiana U., Bloomington.
BASIC PSYCHOLOGICAL STUDIES OF THE EFFECTS OF INCAPACITATING AGENTS.
Final rept.,
by Roger W. Russell. 31 July 62, 179p.
Contract DA18 108 405cml738
Unclassified report

Descriptors: (*Non-lethal agents, Reaction (Psychology)), (*Chemical warfare agents, Motor reactions), Behavior, Rats, Primates, N-heterocyclic compounds, Amines, Analysis of variance, Dosage, Performance tests, Dose rate, Conditioned reflex.

Contents: Research Designs and General Procedures, Chemical Agents, Experiments On Behavior, Relations Between Pharmacological Events and Behavior and Summary and Discussion.

4. CHEMISTRY

AD-427 953 Div. 4
OTS price $1.10

Northwestern U., Evanston, Ill.
MONOENERGETIC PHOTOLYTIC REACTIONS.
Final rept.,
by E. W. Schlag, R. V. Serauskas, and R. Campbell. 8 Nov 63, 2p.
Grant AF AFOSR62 83
AFOSR J1459 Unclassified report

Descriptors: (*Photochemistry, Chemical reactions), Catalysis, Theory.

AD-427 976 Div. 4, 25
OTS price $1.25

Battelle Memorial Inst., Columbus, Ohio.
INFRARED SPECTRA INVESTIGATION OF PARA-SUBSTITUTED BENZENE COMPOUNDS,
Rept. for Nov 61-Apr 63,
by R. J. Jakobsen. Dec 63, 39p.
Contract AF33 657 7440, Proj. 7367, Task 736702
ASD TDR63 869 *Unclassified report

Descriptors: (*Aromatic compounds, Infrared spectroscopy), (*Deuterated compounds, Infrared spectroscopy), Phenols, Organic nitrogen compounds, Raman spectroscopy, Halogenated hydrocarbons, Alkynes, Nitriles, Fluorine compounds.

Complete vibrational assignments were made for a monosubstituted benzene with an electron-donating substituent (phenol) and one with an electron-attracting substituent (benzonitrile). In order to confirm the assignments and to obtain more information on the modes of vibration, ring-deuterated aromatics, phenol and benzonitrile, were prepared and assigned. The effects of disubstitution were studied by making an assignment of p-cresol and several of its deuterated derivatives. By use of the results of these assignments and those available in the literature, frequency assignments in the CsBr spectral region (650-300 reciprocal centimeters) were made from the spectra of 279 benzene derivatives. These assignments include several benzene-like ring deformations and some vibrations that are either internal vibrations of the substituent group or involve the ring-substituent bond. The assigned frequencies show that group frequencies (or rather group perturbations) exist for benzene derivatives in the low-frequency region. Some data have been obtained on the low-frequency (300-50 cm -reciprocal centimeters) infrared spectra of phenol and p-cresol. From these data, assignments can be tentatively made for the O-H...O stretching and bending vibrations. (Author)

AD-427 996 Div. 4
OTS price $4.60

Monsanto Research Corp., Dayton, Ohio.
STUDIES OF LOW TEMPERATURE OXIDATION REACTIONS.
Annual progress rept. no. 1, 1 Oct 62-30 Sep 63,
by L. Parts and John T. Miller, Jr. 30 Sep 63, 41p.
Contract Nonr397700
Unclassified report

Descriptors: (*Cryogenics, Chemical reactions), (*Organoboranes, Oxidation), (*Alkenes, Nitration), Synthesis (Chemistry), Vacuum apparatus, Infrared optical systems, Spectra (Infrared), Organic solvents, Hydrocarbons, Bibliographies.

Autoxidation of methylboranes (CH3)3B, (CH3)-4B2H2, 1,1-(CH3)2B2H4 and of diborane was investigated at cryogenic temperatures in solution. Trimethylborane was the only compound susceptible to oxidation, yielding a coordination polymer. Depolymerization to the monomeric dimethylboryl-methylperoxide occurs at very low temperatures. The mechanism of oxidation is discussed. Nitrosyl nitrate, a metastable isomer of dinitrogen tetroxide, has been found to be unexpectedly reactive toward some diolefins. Dinitro compounds and nitroso nitrates are formed even at -196 C. A low temperature infrared cell, incorporating a horizontal sample compartment, and utilizing a vertical optical beam, has been designed and constructed. It will be used for in situ spectroscopic investigation of reactions at low temperatures. The vacuum line work on the oxidation of methylboranes was completed and the results are incorporated in the report in the form of a manuscript for publication. Work on oxidative nitration, and in low temperature spectroscopy is continuing and the accomplishments to date are presented as a descriptive discussion. (Author)

AD-427 999 Div. 4
OTS price $2.60

New York U., N. Y.
CHRONOPOTENTIOMETRIC STUDY OF ANIONIC DIFFUSION IN THE POTASSIUM-LIQUID AMMONIA SYSTEM.
Technical progress rept.,
by Roger P. Gordon. Jan 64, 23p.
Contract Nonr28537
Unclassified report

Descriptors: (*Potassium, Diffusion), (*Ammonia, Solutions), (*Diffusion, Potassium), Liquefied gases, Electrochemistry, Potassium compounds, Iodides, Electrical double layer, Heat of activation, Ions, Transport properties.

A chronopotentiometric study was made of anion diffusion in solutions of potassium in liquid ammonia ranging in concentration from <0.01M to >0.1M in the presence of excess KI. Diffusion coefficients for the electron of the order of 5 x 10 to the -5th power sq cm/sec were obtained. Measurements were also made in the absence of supporting electrolyte and led to apparent integral diffusion coefficients of the order of 5 x 10 to the -4th power sq cm/sec. The capacitance of the double layer was determined by the ''galvanostatic charging'' method and found to be about 65 microfarads/sq cm. Diffusion activation energies were calculated and found to vary both with concentration and with temperature from 2-9 Kcal/mole or more. The results are interpreted in terms of an electron transport mechanism. It is shown that the height of the electron ''conduction level'' must vary in a surprising manner with concentration and that the tunnel effect transport mechanism is enhanced by increasing the temperature. Explanation for these effects are suggested. (Author)

AD-428 010 Div. 4, 25
OTS price $1.00

Monsanto Research Corp., Dayton, Ohio.
INFRARED SPECTRA OF ORGANOSULFUR COMPOUNDS BETWEEN 2000 AND 250 CM-1.
Rept. for Feb-June 63,
by W. R. Feairheller and John E. Katen. Dec 63, 33p.
Contract AF33 616 8465, Proj. 7360, Task 736005
RTD TDR63 4016 Unclassified report

Report on Materials Analysis and Evaluation Techniques.

Descriptors: (*Organic sulfur compounds, Spectra (Infrared)), (*Sulfoxides, Spectra (Infrared)), (*Spectra (Infrared), Organic sulfur compounds), Absorption spectra, Molecular spectroscopy, Molecular structure, Nomographs, Tables, Sulfides, S-heterocyclic compounds, Oxides.

Spectral data for 19 sulfones, 8 sulfoxides, 5 sulfides, and 2 disulfides were recorded from 1/2000 to 1/250 cm and analyzed for spectra-structure correlations. The information obtained can be applied in the identification of these compounds. The spectra were found to be very rich in absorption frequencies, and would be useful for fingerprint characterization of these materials. Some new group frequencies, useful for diagnosing the presence of the sulfone group, have been found below 1/700 cm. Literature values for group frequencies for sulfones and sulfoxides above 1/700 cm are discussed and corrected. A number of additional effects such as conjugation, intermolecular association, and frequency relationships were investigated. (Author)

AD-428 091 Div. 4, 25, 17
OTS price $7.60

Battelle Memorial Inst., Columbus, Ohio.
STUDY OF SEMICONDUCTING PROPERTIES OF SELECTED RARE-EARTH METALS AND COMPOUNDS,
by J. F. Miller, F. J. Reid, L. K. Matson and R. C. Himes. 31 Dec 63, 65p.
Contract AF33 657 10687, Proj. 4150, Task 415002
RTD TDR63 4231 Unclassified report

Descriptors: (*Rare earth elements, Semiconductors), (*Rare earth compounds, Electrical properties), (*Semiconductors, Rare earth compounds), (*Intermetallic compounds, Rare earth compounds), Cerium compounds, Neodymium compounds, Samarium compounds, Gadolinium compounds, Erbium compounds, Ytterbium compounds, Cerium alloys, Neodymium alloys, Gadolinium alloys, Heat resistant metals and alloys, Selenium alloys, Energy conversion, Arsenides, Antimony compounds, Selenides, Tellurides, Phase studies, Crystal structure, Electrical properties, Thermoelectricity, High temperature research.

A number of selected compounds and alloys of the rare-earth elements, Ce, Nd, Sm, Gd, Er, and Yb in combination with the elements of Chemical Groups V and VI, As, Sb, Se, and Te were prepared and their (electrical) properties studied. Data on crystal structures indicated that, typically in the M-Se and M-Te systems, four types of crystalline phases exist: the MX, MX(2), and MX(4) compounds, and a single phase spanning the M(3)X(4)-M(2)X(3) composition range. Electrical characteristics of these refractory materials were found to range from those of high-resistivity semiconductors to those of metallike conductors. Analyses are made of electrical conduction in the NdSe-SmSe alloy system and of the type of chemical bonding prevailing in M(3)X(4)-M(2)X(3) selenide and telluride phases. (Author)

AD-428 105 Div. 4
OTS price $1.10

Colorado U., Boulder.
HALOGENOID COMPLEXES.
Progress rept. no. 4, 1 Apr-30 Sep 63.
by R. N. Keller. 30 Sep 63, 6p.
Grant DA ARO D31 124G198, AROD Proj. 3292C
Unclassified report

Descriptors: (*Azides, Stability), (*Cynates, Complex compounds), Mercury compounds, Spectra (Visible and ultraviolet), Metalorganic compounds, Arsenic compounds, Polycyclic compounds, Iron compounds, Copper compounds, Aromatic compounds, Organic phosphorus compounds.

AD-428 109 Div. 4, 25
OTS price $1.10

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
REACTION KINETICS, THE THEORY OF LIQUIDS, AND OPTICAL ROTATION.
Progress rept. no. 3, 1 Apr-30 Sep 63,
by Dennis Caldwell, Gilford Chappell, MarLynn James, Sheng Hsien Lin and R. P. Marchi.
30 Sep 63, 7p.
Grant DA ARO D31 124G298
Unclassified report

Descriptors: (*Reaction kinetics, Chemical bonds), (*Liquids, Thermodynamics), Chromatographic analysis, Dissociation, Energy, Chelate compounds, Magnetic moments, Molecular rotation, Phonons, Momentum, Perturbation theory.

AD-428 142 Div. 4
OTS price $1.60

Research Inst. Temple U., Philadelphia, Pa.
(No title).
Quarterly progress rept. no. 1, 1 Oct-31 Dec 63.
31 Dec 63, 14p.
Contract AF04 611 9555, Proj. 3148, Task 3148 0 1
Unclassified report

Descriptors: (*Radiation chemistry, Scientific research), (*Free radicals, Synthesis (Chemistry)), Oxidizers, Oxygen compounds, Fluorides, Atoms, Hydrogen, Electrical equipment, Gamma rays, Paramagnetic resonance, Radiation effects.

The existence of OF radicals has not yet been proved. Since certain elusive OF-containing compounds would be strong oxidizers, identification and study of these radicals should assist in the synthesis of new oxidizers. The purpose of this research is to produce, isolate and identify the OF., O2F. and O3F. radicals. It is planned to prepare these radicals by two methods: I. Bombardment of OF2, O2F2, O3F2, and O2BF4 with H atoms at 77 K. or lower. II. Irradiation of these compounds with Co60 gamma-rays at 77 K. or lower. (Author)

AD-428 143 Div. 4
OTS price $1.00

Research and Technology Div., Air Force Systems Command, Edwards, Calif.
STERIC EFFECTS IN ALPHA-OLEFIN REACTIVITY,
Rept. for Nov 62-June 63,
by David W. Thomson. Nov 63, 27p.
Proj. 7340, Task 734004
RTD TDR63 4107 Unclassified report

Report on Nonmetallic and Composite Materials.

Descriptors: (*Alkenes, Reaction kinetics), (*Stereochemistry, Alkenes), (*Reaction kinetics, Alkenes), Polymers, Molecular structure, O-heterocyclic compounds, Synthesis (Chemistry), Hydrocarbons, Hydroperoxides, Aromatic compounds.

Addition reactions to the double bond of a

series of sterically-hindered alpha-olefins have been carried out. The kinetics of these reaction were measured and the rates of reaction correlated with the steric effects present in the olefin. A theory known as ''Newman's rule of six'' has been successfully applied to alpha-olefins to correlate reaction rates with steric effects and to explain, in part, the difficulty of obtaining desirable polymers from these olefins. (Author)

AD-428 328 Div. 4, 25
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS RESEARCH PROGRAM. LOW-TEMPERATURE ELECTRONICS.
Semiannual technical rept. 1 Jan-30 June 63,
by F. L. Vernon, Jr. 6 Dec 63, 17p. Rept. no. TDR169 3250 13TR1
Contract AF04 695 169
SSD TDR63-311 Unclassified report

Descriptors: (*Cryogenics, Electric wire), (*Electric wire, Niobium), (*Niobium, Superconductivity), Physical properties, Resistance (Electrical), Electric current, Magnetic fields, Filaments, Electric potential.

Research in low-temperature electronics consisted primarily of measurement of the performance of critical current - critical field (Ic-Hc) characteristics of annealed niobium wire specimens. In the experiments performed, the peak effect in the Ic-Hc characteristics occurred only for H perpendicular to the sample axis (and the current flow) and only for samples which were annealed at temperatures of 1400 C and above. For fields parallel to the current, an anomalous resistance was noticed for fields and currents well within the values which usually allow the sample to be superconducting. This island effect, to date, does not have a satisfactory explanation. Correlation of the field at which the peak effect occurs and the Hc2 of the Abrikosov theory show satisfactory agreement and indicate that niobium is intrinsically a superconductor of the second type. Some limited experimental work was performed on thin filamentary superconductors. (Author)

AD-428 441 Div. 4
OTS price $1.10

Naval Radiological Defense Lab., San Francisco, Calif.
GAMMA RADIATION EFFECTS ON ISOPRENOIDS. III. 2-METHYLBUTENE-2 AND 2-METHYLBUTANE,
by W. E. Shelberg and J. F. Pestaner. 28 Oct 63, 10p.
Task 0401
NRDL TR699 Unclassified report

Descriptors: (*Alkenes, Radiation effects), (*Rubber, Synthesis (Chemistry)), Elastomers, Radiation chemistry), Gamma rays, Hydrogen, Carbon compounds.

Hydrogen and methane radiation yields (molecules per 100 e.v. absorbed) were determined for 2-methylbutene-2 and 2-methylbutane. G(H2) and G(CH4) are 1.15 and 0.20 respectively for 2-methylbutene-2, and 4.60 and 0.57 respectively for 2-methylbutane. The hydrogen and methane yields are linear with dose at low conversions. The value of G(H2) for 2-methylbutene-2 fits a relationship, which defines G(H2) for rubber-type isoprenoids (such as 2,6-dimethyloctadiene-2,6, squalene, and rubber) in terms of the number of their isoprenoid units, so that G(H2) = 0.48 (1 plus 1.4/I) where I is the number of isoprenoid units. (Author)

AD-428 483 Div. 4
OTS price $2.50

Bureau of Reclamation, Denver, Colo.
TECHNICAL DESCRIPTION AND APPLICATIONS OF GAS CHROMATOGRAPHY,
by E. T. Lyons. 2 Aug 63, 21p.
BR D LR CH107 Unclassified report

Descriptors: (*Chromatographic analysis, Instrumentation), Separation, Mixtures, Thermal conductivity, Ionization, Flames.

The purpose of this report is to describe briefly but adequately the background and principles of this technique, and to show in addition that these principles are of considerable importance and interest entirely apart from their application to specific analytical problems. It is hoped moreover that this description and explanation will call to the attention of others in the Bureau the possible application of this technique to the investigation of materials other than those to which it has already been applied, i.e., herbicides and fatty alcohols. (Author)

AD-428 582 Div. 4, 25
OTS price $2.60

Noyes Chemical Lab., U. of Illinois, Urbana.
NMR STUDIES OF PHASE TRANSITIONS. II. NaCN.,
by C. K. Coogan and H. S.Gutowsky. 31 Dec 63, 23p. TR69
Contract Nonr1834 13, Proj. NR051 215
Unclassified report

Descriptors: (*Crystal structure, Transition temperature), (*Phase studies, Nuclear magnetic resonance), (*Sodium compounds, Cyanides), Crystal lattices, Electric fields, Dipole moments, Nucleation, Symmetry (Crystallography), Heat of activation, Quadrupole moments.

The Na-23 nuclear magnetic resonance absorption has been observed in the cubic phase of polycrystalline NaCN between about 15 C and 170 C, but could not be detected in the orthorhombic phase which forms below 10.5 C. The electric field gradients involved are attributed to the electric dipoles of the CN-ions and the temperature dependence and to the averaging out of the gradients by thermally activated reorientations of the CN-ions. The reorientations are deemed responsible for the existence of a cubic phase. They are treated as a random walk problem yielding algebraic expressions by means of which an activation energy of 6 kcal/mole is obtained. (Author)

AD-428 591 Div. 4, 25 20
OTS price $5.60

Denver Research Inst., Colo.
INVESTIGATION OF THE CHARACTERISTICS OF INTERMETALLIC COMPOUNDS AS THERMIONIC EMITTERS,
Final technical summary rept.,
by C. B. Magee, M. J. Pool, W. D. McMullen, R. C. Jerner and R. H. Cox. 31 Dec 63, 56p.
Rept. no. 2137
Contract NONR3361 01, Proj. NR099 362
Unclassified report

Descriptors: (*Intermetallic compounds, Thermionic emission), (*Thermionic emission, Intermetallic compounds), (*Beryllium compounds, Evaporation), Niobium compounds, Tantalum compounds, Zirconium compounds, Diodes, Glass, Stainless steel, Low-pressure research, Sublimation, Enthalpy, Crystal structure, Compatibility, Cesium, Reactor materials, High Temperature research, Metallography, Tungsten, Thermionic converters.

The evaporation rates of twelve intermetallic beryllides and beryllium have been measured in the temperature range from 900 to 1200 C, using the Langmuir free evaporation technique. The beryllides studied were ZrBe13, Zr2Be17, ZrBe5, ZrBe2, NbBe12, Nb2Be17, NbBe3, NbBe2, TaBe12, Ta2Be17, TaBe3 and TaBe2. Representative results are listed for three temperatures. Evaporation rates are given in mg/sq cm/day. (Author)

AD-428 624 Div. 4
OTS price $1.10

Oregon U., Eugene.
STUDIES OF GASEOUS REACTIONS.
Progress rept., 1 Apr-1 Oct 63,
by David S. Burch. 1 Oct 63, 2p.
Grant DA ARO D31 124G267, Proj. 3512P
Unclassified report

Descriptors: (*Recombination reactions, Nitrogen), (*Reaction kinetics, Recombination reactions), Electrons, Paramagnetic resonance, Photochemistry, Nitrogen compounds, Oxides, Ultraviolet radiation, Fluorescence, Gases, Chemical reactions.

AD-428 687 Div. 4
OTS price $8.10

Wisconsin U., Madison.
MOLECULAR CATALYSIS AND INTERACTIONS IN AQUEOUS SOLUTIONS.
Final rept., Sep 62,
by T. Higuchi. 8 Jan 64, 63p.
Grant DA CML18 108G39
Unclassified report

Descriptors: (*Organic phosphorus compounds, Hydrolysis), (*Esters, Organic phosphorus compounds), (*Hydrolysis, Organic phosphorus compounds), Exchange reactions, Reaction kinetics, Catalysis, Enzymes, Molecular structure, Alcohols, Aromatic compounds, Alkanes, Chlorine compounds, Oximes.

Results of an investigation of some of the mechanisms leading to the eventual hydrolysis of certain phosphonate esters are presented. Studies were concerned in general with nucleophilic exchange reactions involving these esters, and more particularly with the replacement reactions of isopropyl p-nitrophenyl methyl phosphonate (1370) and with the hydrolytic rates of certain other derivatives. Kinetic studies of hydrolysis of isopropyl o-hydroxyphenyl methyl phosphonate show that this compound hydrolyzes by three kinetically different mechanisms: (1) water attack on the unionized molecule; (2) hydrolysis of the ionized molecule by probable intramolecular catalysis; and (3) hydroxyl attack on the ionized molecule, with the subsequent formation of o-hydroxyphenyl methyl phosphonic acid and the elimination of the isopropyl group. Effects of various nuclear substituents on the rate of hydrolysis of the phenolate esters were also determined. (Author)

AD-428 773 Div. 4, 17
OTS price $2.60

Technische Hochschule, Vienna (Austria).
X-RAY FLUORESCENCE ANALYSIS OF RARE EARTH METALS,
by F. Lihl. 31 Oct 62, 22p. Technical note no. 2
Contract 61 052 609
Unclassified report

Descriptors: (*Manganese alloys, Quantitative analysis), (*Rare earth elements, Alloys), (*Quantitative analysis, Manganese alloys), X-ray spectrum, X-rays, Fluorescence, Gadolinium alloys, Samarium compounds, Yttrium compounds, Excitation.

The problem of analysing RE-manganese alloys, which is difficult with conventional chemical methods when small specimens are concerned and when high accuracy is required, can be solved by means of X-ray fluorescence analysis. The factors which are of influence here, as f. i. matrix effects, excitation conditions, counter statistics,etc., are discussed in detail. A method is given by which RE (Gd, Sm, Y)-manganese alloys (RE : Mn = from 1:100 to 100:1) can be quantitatively analysed in specimens from 0.001 to 0.02 gr and with an accuracy of 0.5 per cent (relative) and a statistical certainty of 99.7 per cent. For the Gd-Mn system the calibration curve, limit of detection (Gd : 0,002 g/l; Mn: 0,001 g/1), and determinable difference of concentration in two specimens are give numerically. (Author)

AD-428 799 Div. 4, 14
OTS price $1.60

Food Machinery and Chemical Corp., Princeton, N. J.
QM ELASTOMER CONTRACT.
Progress rept. no. 1, 26 June-26 Sep 63,
by J. A. Gannon. 22 Oct 63, 12p. Rept. no. PCR337
Contract DA19 129AMC147N, Proj. B132
Unclassified report

Descriptors: (*Polymers, Synthetic rubber), (*Halogenated hydrocarbons, Synthetic rubber), (*Silanes, Synthetic rubber), (*Fluorine compounds, Synthetic rubber), Copolymerization, Siloxanes, Cycloalkanes, Synthesis (Chemistry), Alkenes, Low temperature research.

The reaction of tetrafluoroethylene with fluoroolefinic silanes has been shown to occur at elevated temperatures to form products containing a perfluorinated cyclobutane ring. Although conversions were low, the reaction provides a basis for further studies involving difunctional moieties which can lead to novel block copolymer systems comprised of siloxane units and fluorocarbon units in alternating sequences. (Author)

AD-429 009 Div. 4, 17
OTS price $3.60

Technische Hochschule, Vienna (Austria).
THE PREPARATION AND STRUCTURES OF RE-MERCURY COMPOUNDS. THE EVAPORATING OF MERCURY FROM AMALGAMS,
by F. Lihl. 30 Apr 63, 31p. Rept. no. TN4
Contract AF61 052 609
Unclassified report

Descriptors: (*Rare earth compounds, Mercury compounds), (*Mercury alloys, Rare earth elements), Laboratory furnaces, Distillation, Crystal structure, Lanthanum compounds, Cerium compounds, Praseodymium compounds, Neodymium compounds, Samarium compounds, Gadolinium compounds, Yttrium compounds, Metallography, X-ray diffraction analysis, Evaporation, Laboratory equipment.

Compounds of samarium, gadolinium and yttrium with mercury were prepared by direct reaction between the RE-metals and mercury vapor at temperatures between 200 - 500 C. The RE-metals form compounds of the formulas ReHg, ReHg2 and ReHg3. The respective Sm compounds fit to the data, which have been given earlier. The Gd and Y

compounds were prepared and studied for the first time. Their structures and lattice spacings were evaluated and are very similar. A furnace suitable for the preparation of RE-metals and alloys from the amalgams at higher temperatures is described. The obtained RE-metals are practically free of mercury and have the same structures and lattice spacings as well annealed metals, obtained by fusion. (Author)

AD-429 156 Div. 4
OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE FERROUS-FERRIC DOSIMETER: A REVIEW,
by Edward A. Burke. Dec. 63, 21p.
AFCRL 63 587 Unclassified report

Descriptors: (*Radiation measurement systems, Radiation chemistry), (*Radiation chemistry, Radiation measurement systems), Iron compounds, Sulfates, Ions, Ammonium compounds, Chemical reactions, Radiation effects, Oxidation, Radiometers, Spectrophotometers.

The characteristics, preparation, and use of the ferrous-ferric dosimeter are reviewed in detail. This includes a discussion of the dose range, dose rate dependence, energy dependence, and temperature effects. For photons with energies in excess of 6 kev the irradiation yield may be represented by the expression G = 15.61 - 15.43/E, where E is the mean photon energy in kev and G is the number of ferrous ions oxidized per 100 ev of energy absorbed. Several methods of measuring ferric ion concentration are described, including the conventional spectrophotometric determination of ferric and ferrous ion and the very sensitive radiometric measurement of ferric ion. A concise summary of all the information necessary for routine application of this dosimeter is given at the end of the report. (Author)

AD-429 230 Div. 4, 14
OTS price $2.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
DIELECTRIC MATERIALS FOR HIGH TEMPERATURE EVALUATION.
Rept. for 15 Sep-16 Dec 63,
by Joseph Green and Nathan Mayes. 16 Dec 63, 15p.
Rept. no. RMD 5038Q1
Contract NObs90065, Proj. SR007 03 03, Task 1000
Unclassified report

Descriptors: (*Embedding substances, Organoboranes), (*Heat resistant plastics, Organoboranes), (*Silicone plastics, Organoboranes) (*Dielectrics, Organoboranes), Organoboranes, Polycyclic compounds, O-heterocyclic compounds, Polymerization, Siloxanes, Bromine compounds, Stability, High temperature research, Gravimetric analysis, Pyrolysis, Elastomers.

Research was conducted toward the preparation of thermally stable carborane siloxane materials for use as embedding compounds and elastomers. Hydrocyclosiloxanes were prepared for subsequent conversion to the corresponding carborane cyclic compounds. A carborane cyclotetrasiloxane was prepared and polymerized. A linear carborane siloxane of greater than 7,000 molecular weight was prepared and its thermal properties evaluated by DTA and TGA. (Author)

AD-429 260 Div. 4
OTS price $5.60

California Inst. of Tech., Pasadena.
A SEARCH FOR HOT RADICAL REACTIONS IN FLASH PHOTOLYSIS.
Final rept.,
by Gilbert J. Mains. 30 Nov 63, 54p.
Grant AF AFOSR62 51
AFOSR J1521 Unclassified report

Descriptors: (*Photochemistry, Decomposition) (*Decomposition, Photochemistry), (*Ketones, Photochemistry), (*Mercury compounds, Photochemistry), Hydrocarbons, Metalorganic compounds, Alkanes, Free radicals, Alkenes, Disproportionation, Recombination reactions, Deuterated compounds, High temperature research, Vapors.

Flash photolysis of diethyl ketone produced carbon monoxide, butane, ethylene, ethane, propane, propionaldehyde, hydrogen and methyl ethyl ketone as products of decreasing importance. The observation of diethyl ketone-d sub 5 among the flash photolysis products of a mixture of diethyl ketone and diethyl ketone-d sub 10 confirmed the importance of the propionyl radical at 24 C and its temperature dependence. While most of the products were explainable in terms of the low intensity photolysis mechanism, it was necessary to postulate reactions of vibrationally hot species to explain the production of hydrogen, propane, methyl ethyl ketone and the large relative yield of ethylene. Observed products from flash photolysis of diethyl mercury at room temperature were butane, ethylene, ethane, propane and hydrogen in decreasing importance. The reaction products from the ethyl mercury radical were not observed. Because of the relatively high yield of ethylene, it was necessary to invoke mechanisms involving reactions of hot ethyl radicals including unimolecular decomposition and disproportionation reactions. (Author)

AD-429 261 Div. 4
OTS price $1.10

Ohio State U. Research Foundation, Columbus.
REACTIONS OF CHLOROCARBONIUM IONS.
Final rept. for Oct 61-31 Dec 63,
by M. S. Newman. Dec 63, 2p.
Grant AF AFOSR62 28, Proj. 9762, Task 37620
AFOSR J1623 Unclassified report

Descriptors: (*Ketones, Chemical reactions), (*Cycloalkanes, Synthesis (Chemistry)), (*Halogenated hydrocarbons, Synthesis (Chemistry)), Phosphorus compounds, Chlorine compounds, Alkenes, Aromatic compounds, Monocyclic compounds, Polycyclic compounds.

AD-429 277 Div. 4, 32
OTS price $3.60

National Academy of Sciences, Washington, D. C.
MEETING OF IUPAC COMMISSION ON ORGANIC NOMENCLATURE, JULY 20-26, 1961 AND SYMPOSIUM ON NOMENCLATURE, JULY 27-29, 1961 HELD IN COLUMBUS, OHIO.
1962, 37p.
Grant AF AFOSR61 103
AFOSR 2846 Unclassified report

Descriptors: (*Symposia, Chemistry), (*Chemistry, Documentation), (*Documentation, Chemistry), Coding, Language, Aromatic compounds, Alkanes, Amines, Metalorganic compounds.

The XXIst Conference of IUPAC held in Montreal in August 1961, presented a favorable opportunity for the Union's Commission on Organic Nomenclature to hold its annual meeting in the United States and thus to become more directly acquainted with the views of the very large number of organic chemists on this side of the Atlantic. To promote this exchange of views the Division of Chemistry and Chemical Technology of the NAS-NRC,

in collaboration with the American Chemical Society's Committee on Organic Nomenclature, arranged for the IUPAC Commission to meet in Columbus, Ohio, at the office of Chemical Abstracts Service, during the period July 20-26, and for a Symposium on Nomenclature to follow on July 27-29. This report presents a digest of the proceedings of these two fruitful meetings. (Author)

AD-429 279 Div. 4
OTS price $2.60

Georgia U., Athens.
A THERMODYNAMIC STABILITY SCALE FOR STABLE, ISOLABLE FREE RADICALS.
Final technical rept., 1 Oct 61-30 Sep 63, by Robert C. Lamb and Carroll T. Clark.
29 Nov 63, 28p.
AFOSR J1520 Unclassified report

Descriptors: (*Free radicals, Chemical reactions), (*Polycyclic compounds, Free radicals), (*Chemical equilibrium, Free radicals), Stereochemistry, Thermochemistry, Heat of formation, Chemical reactions, Reaction kinetics, Stability, Organic solvents, Decomposition, Ketones, Peroxides, Aromatic compounds, Nitrates.

During the report period, seven galvinoxyl derivatives were placed on an approximate stability scale based on their affinities for the H atom furnished by diphenylpicrylhydrazine (in benzene). Although the stability scale is not very accurate, it appears to be essentially correct. The thermodynamic groundwork on which the scale is based allows the delta F values to be cross-checked. Four experiments on the galvinoxyl-diphenylpicrylhydrazine system were also performed in 90% tert. butyl alcohol-10% benzene. The value obtained for delta F is +0.97 ± 0.02 kcal. at 30 degrees. Free radical scavenger experiments with Koelsch's radical are reported. (Author)

AD-429 298 Div. 4
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
CARRIER-FREE SEPARATION OF THE INDIVIDUAL RARE EARTH RADIONUCLIDES FROM FISSION PRODUCT MIXTURES.
by L. Wish and S. C. Foti. 5 Dec 63, 16p.
NRDL TR704 Unclassified report

Descriptors: (*Fission products, Separation), Rare earth elements, Yttrium, Solvent extraction, Alkaline earth metals, Test methods, Radiation chemistry.

A procedure based on solvent extraction with diethylhexylphosphoric acid was tested for the quantitative carrier-free separation of yttrium and the rare earth group elements from other fission products. This procedure is simpler and more rapid than the previously used cation exchange resin separations of rare earths from alkali metals and alkaline earths. Subsequent quantitative carrier-free isolation of individual rare earth fission products was accomplished by their elution from cation exchange resin with alpha-hydroxyisobutyric acid at room temperature. (Author)

5. COMMUNICATIONS

AD-427 918 Div. 5, 12
OTS price $4.60

Boeing Co., Seattle, Wash.
REPORT OF THE MINUTEMAN HF RADIO COMMUNICATIONS SYSTEM TEST,
by P. N. Hales. 27 Dec 63, 41p. Document no. T2 3188 1
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Radio communication systems, Guided missiles (Surface to surface)), High frequency, Air force, Tests, Frequency, Power, Dummy load, Experimental data, Hardening, Crystal rectifiers, Radiofrequency power, Standing wave indicators, Impedance matching, Test equipment (Electronics), Diodes (Semiconductor), Transients, Limiters.

This report contains the results of the joint Boeing/Collins System Test of the Minuteman Hard HF Radio Communications System. The tests were conducted in accordance with Test Plan D2-15674-1. The purpose of the tests was to discover the cause of, and to find and verify solutions to, those problems identified by the Functional Compatibility Test (test report T2-3139-1), and to identify and solve any other system problems encountered. The identified and investigated system problems were: directional coupler diode failure, false tune of antenna, and excessive system SWR after fine tune. Solution to these system problems were found and verified to the satisfaction of both Boeing and Collins. (Author)

AD-427 931 Div. 5, 8
OTS price $4.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF MODIFIED SPECTRUM SIGNATURE OF RADIO TRANSMITTING EQUIPMENT TED-9.
Final rept.,
by J. E. Parham. 28 Mar 62, 1v.
Proj. SF0131504
NATC WST5 202 Unclassified report

Descriptors: (*Radio transmitters, Radiofrequency spectroscopy), Very high frequency, Ultra high frequency, Test methods, Noise (Radio), Test equipment (Electronics), Tables, Radiofrequency power.

A modified spectrum signature of Radio Transmitting Equipment TED-9, consisting of power output and spurious emissions tests, was made in accordance with MIL-STD-449A of 25 October 1961. The tests were conducted at 238.4 Mc, 312.0 Mc, and 384.2 Mc. Additional tests were conducted at the mean test frequency (312.0 Mc) on two other transmitters, TED-9 Serial No. 1086 and TED-4 Serial No. 426. (Author)

AD-427 932 Div. 5
OTS price $4.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF MODIFIED SPECTRUM SIGNATURE OF RADIO RECEIVING SET AN/URR-35.
Final rept.,
by T. R. Gardner and R. Newcity. 26 Apr 62, 1v.
Proj. SF0131504
NATC WST5 272 Unclassified report

Descriptors: (*Radio receivers, Radiofrequency spectroscopy), Very high frequency, Ultra high frequency, Amplitude modulation, Distortion, Calibration, Sensitivity, Spectrum analyzers, Test equipment (Electronics), Test methods.

Investigation of the Modified Spectrum Signature of Radio Receiving Set AN/URR-35 was conducted in accordance with MIL-STD-449A of 24 October 1961. The modified spectrum signature consisted of spurious response and receiver sensitivity measurements. Additionally, the spectrum of the local oscillator-multiplier section was measured. Spurious responses were located up to four octaves above the receiver tuned frequency. (Author)

AD-427 933 Div. 5
OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF MODIFIED SPECTRUM SIGNATURE OF RADIO SET AN/URR-35.
Supplemental rept.,
by R. L. Roeder. 4 Sep 63, 6p.
NATC WST4 551 Unclassified report

Descriptors: (*Radio receivers, Radiofrequency spectroscopy), Test sets, Very high frequency, Ultrahigh frequency, Test equipment (Electronics), Bandwidth.

Selectivity measurements were made on Radio Receiving Set AN/URR-35 on 15 August 1963 at NANEP, NATC, Patuxent River, Maryland. These data were requested by the Electromagnetic Compatibility Analysis Center to supplement existing spectrum signature measurements on the AN/URR-35. The CW selectivity was measured in accordance with MIL-STD-449A of 24 October 1961. The selectivity measurements were made with the receiver tuned to the test frequencies of 240, 312, and 384 Mc. The test equipment arrangement is shown by a block diagram. (Author)

AD-427 934 Div. 5
OTS price $5.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF SPECTRUM SIGNATURE OF RADIO TRANSMITTING EQUIPMENT TYPE TV-6.
Final rept.,
by V. W. Williams. 1 Aug 63, 1v.
Proj. SF0131504
NATC WST4 467 Unclassified report

Descriptors: (*Radio transmitter, Radiofrequency spectroscopy), (*Radiotelephones, Radiofrequency spectroscopy), Very high frequency, Amplitude modulation, Tests, Test equipment (Electronics), Bandwidth, Frequency, Stability, Sidebands, Scattering, Distortion, Test methods.

A spectrum signature was conducted on a Radio Transmitting Equipment Type TV-6 to determine its emission characteristics. The TV-6 is an amplitude modulated, single channel, VHF radio telephone transmitter designed to operate in the frequency range of 118-152 mc. All measurements were made in accordance with MIL-STD-449A of October 1961. (Author)

AD-428 190 Div. 5, 8
OTS price $4.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
ON THE REALIZABILITY AND CHANNEL CAPACITY OF PASSIVE TWO-PORTS,
by T. B. Horgan. Nov 62, 43p. RR EE503, TR65
Contract DA36 039sc85272
Unclassified report

Descriptors: (*Communication systems, Electrical networks), Theory, Signals, Electrical properties, Power, Noise (Radio), Measure theory, Integral equations, Mathematical analysis.

The LLFPB two-port network is considered as a communication channel and an integral relation, for its communication capacity is derived. The noise mechanism is assumed to be that due to the Nyquist relation for pertinent real parts, and the channel capacity is given by an interpretation of Shannon's upper bound. It is shown that an ideal signal spectrum is uniquely associated with a given network, this spectrum being a function of the network parameters and the available signal power. It follows that the channel width W of Shannon's upper bound is not a unique number for an LLFPB two-port, but rather, is a function of the signal power S and the noise power N. (Author)

AD-428 380 Div. 5, 12
OTS price $3.60

Page Communications Engineers, Inc., Washington, D. C.
SPACE COMMUNICATIONS TECHNIQUES.
Dec 63, 28p.
Contract AF30 602 2403, Proj. 4519, Task 451901
RADC TDR63 611, suppl. 1 Unclassified report

Descriptors: (*Communication satellites (Passive), Space communication systems), (*Space communication systems, Radar antennas), Test facilities, Construction, Design, Installation, Electronic equipment, Radar transmitters, Radar reflectors.

Modification and completion of instrumentation for use in communications experiments with passive satellites are reported. Boresighting instrumentation was installed at the Floyd test site near Rome, N. Y., and modifications for optical viewing were made to a 60-foot antenna reflector at that site. The cassegrain subreflector for the Trinidad site antenna was rebuilt and tested. Instrumentation for pulse operation at the communications frequency at the Trinidad site was completed with the installation of a duplexer and a receiver protector. (Author)

AD-428 435 Div. 5, 15
OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE STABILITY ANALYSIS OF A TWO-WAY CONTROLLED CARRIER TRANSMISSION SYSTEM,
by Neil J. Bershad. Dec 63, 9p.
Proj. 5628
AFCRL 63 586 Unclassified report

Descriptors: (*Communication systems, Mathematical models), Stability, Troposphere, Noise (Radio), Linear systems, Integrals.

A mathematical model of a linear controlled-carrier tropospheric communication system is analyzed for tropospheric gain variations with a white-noise power spectral density. The stability of the first moment of the impluse response of the closed loop control system is determined as a function of the linear controllers and the statistical characteristics of the troposphere. (Author)

AD-428 597 Div. 5, 30, 12
OTS price $4.60

System Development Corp., Santa Monica, Calif.
FREQUENCY ANALYSIS OF MACHINE INSTRUCTIONS IN COMPUTER PROGRAM SYSTEMS,
by Robert E. Bleier. 19 Nov 63, 43p. TM 1603
Contract SD97
Unclassified report

Descriptors: (*Programming (Computers), Statistical analysis), (*Statistical analysis, Programming (Computers)), Statistical distribution, Costs, Programming languages, Space surveillance systems, Satellites (Artificial), Tracking.

This paper reports partial results of an analysis to develop a tool for estimating the number of instructions in a program system. For the analysis, instructions were aggregated into classes, e.g., arithmetic, shift, decision. The analysis examined the relationships between the number of instructions in a class and the total number of instructions in a computer program system. The work completed to date provides counts of the number of instructions and classes of instructions in nine program systems. Results indicate that a consistent relationship exists between the number of instructions in the decision class and the length of each program system. (Author)

AD-428 758 Div. 5, 7
OTS price $1.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION OF SELECTED COMMUNICATIONS AND GROUND POWER EQUIPMENT UNDER COLD WEATHER CONDITIONS,
by Edward P. Gumphrey. Jan 64, 10p.
TAC TR63 73 Unclassified report

Descriptors: (*Communication equipment, Cold weather tests), (*Motor generators, Cold weather tests), Radio communication systems, Transmitter receivers, Maintenance, Performance (Engineering), Batteries & components.

A test was conducted to determine the capabilities of selected communications and ground power equipment to operate under cold weather conditions, prior to winter use of the same equipment on a field exercise in Alaska. It was concluded that the AN/TSC-15 and AN/MRC-94 Communications Centrals, the AN/PRC-25, AN/PRC-41 and AN/PRC47 Radios, as well as the PU-549/G Generator Set, can be operated at a temperature of -40 degrees F., when certain precautions and procedures are observed. (Author)

AD-428 808 Div. 5, 18
OTS price $9.10

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES. SESSION 9. INFORMATION SYSTEM DESIGN TECHNIQUES.
Jan 64, 103p. Rept. no. MSS9
Contract AF33 600 39852, Proj. 7040
ESD TDR63 474 9
Unclassified report

Descriptors: (*Data processing systems, Military requirements), (*Scientific research, Data processing systems), Communication systems, Display systems, Armed forces procurement, Information retrieval, Command and control systems, Theory.

A set of actions is presented to aid in the design of the systems. The System Design Sentence is stated, and is used in a primer for design techniques. Three design techniques are described: the inclusion principle, the key man approach, and the application of information control. The applications of these three techniques are reviewed. The problems of military information system design are approached by first trying to identify the basic nature of in-

formation in terms of the command context and the economic relationships that govern and give purpose to information systems in general. Second, the hierarchy of command is analyzed from an informational point of view and its informational efficiencies are assessed. Third, the informational activities which take place in the command hierarchy are considered, and their underlying processes, to which technological support may be brought, are studied. The problems are then discussed in detail, using the above approach as a foundation. (Author)

AD-428 845 Div. 5, 25, 8
OTS price $5.60

Electrical Engineering Research Lab., U. of Texas, Austin.
THE STATIC AND DYNAMIC TEMPERATURE CHARACTERISTICS OF THE OXYGEN LINE AT THE 2.5 MM WAVELENGTH.
Quarterly Engineering rept. no. 7, 1 Nov 63-31 Jan 64,
by Eddie H. Young, Jr. Jan 64, 1v.
Contract AF33 657 8716, Proj. 4062
Unclassified report

Descriptors: (*Oxygen, Microwave spectroscopy), Radio transmission, Microwave frequency, Wave transmission, Attenuation, Pressure, Temperature, Atmosphere, Models (Simulation), Model tests, Space communication systems.

The absorption of the microwave energy by oxygen was examined both theoretically and experimentally, as it is found that the oxygen interaction contributes largely to the microwave attenuation of the atmosphere. The investigation under simulated atmospheric conditions consisted of two parts: the static temperature dependence of attenuation, and the attenuation under dynamic changes of temperature and pressure. The results of measurements and theories are presented and compared. The control of temperature and pressure of 02 can be best achieved in a closed cell. The instrumentation and techniques of measurement are discussed. (Author)

AD-429 202 Div. 5, 8
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MINIMUM SIGNAL TO NOISE-DENSITY RATIOS FOR TRANSMISSION OF TELETYPE AND SPEECH,
by F. F. Yates. Jan 64, 9p. Rept. no. TDR269 4111 7
Contract AF04 695 269
SSD TDR63 215 Unclassified report

Descriptors: (*Radio teletype systems, Signal-to-noise ratio), (*Voice communication systems, Signal-to-noise ratio), Radio transmission, Phase modulation, Errors, Intelligibility, Bandwidth.

The signal-to-noise requirements of a phase modulation communication channel are considered for the transmission of teletype and voice for certain specified performance criteria. Three typical communication services are analyzed: 100 wpm teletype - 1/20 letter error rate; 3 kc voice - 80% word intelligibility, and 3 kc voice - 30 db output baseband signal-to-noise ratio. The transmission requirements are expressed in terms of the minimum signal-to-noise-density ratio required in the pre-detection bandwidth of the signal demodulator. The results are summarized. (Author)

AD-429 214 Div. 5, 18
OTS price $8.10

•ITT Federal Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 29, 21 Oct-20 Nov 63.
20 Dec 63, 1v. Rept. no. 20130
Contract AF19 626 8
ESD TDR64 176 Unclassified report

Descriptors: (*Strategic Air Command, Command & control systems), (*Command & control systems, Air Force), (*Weapon systems, Strategic Air Command), (*Test methods, Weapon systems), Ground support equipment, Display systems, Data processing systems, Data transmission systems, Performance (Engineering), Reliability (Electronics), Communication systems.

The status of the Strategic Air Command Control System testing as of November 1963 is presented. Information is given concerning the 465L System Test Plan. The information is organized generically by Centrals and other descriptive titles for activities of similar scope. These, in turn, are consolidated according to subsystem and comparable collective designations. Testings not attributable to the 465L System Test Plan are reported in paragraphs associated with their related test activities. The System Test Facility (STF) supported demonstrations, special tests and training. Operational information and test data obtained at the STF are used in planning and development of the 465L System. Activities conducted in connection with the Data Transmission Subsystem included ARP/RCC/EDTCC 80-14 Integration testing; 41 other ARP/RCC/EDTCC integrations; 8 RCC/EDTCC's integrations; and crosstell integration of the Barksdale and March EDTCC's. Data Display Subsystem activities included Category II, Part I Tests of the Barksdale AFB Printer/Request Chains, Group Display Chain FACI, and in-Plant Reliability testing of the March AFB Request Chain. (Author)

AD-429 327 Div. 5, 30, 18
OTS price $10.50

ITT Communication Systems, Inc., Paramus, N. J.
SIMULATION OF DEFENSE COMMUNICATIONS SYSTEM.
Final summary rept.
13 Feb 64, 1v. Rept. no. ICS64TR369
Contract SD99
Unclassified report

Descriptors: (*Global communication system, Simulation), Digital computers, Programming (Computers), Military requirements, Communication theory, Data processing systems, Data storage systems, Data transmission systems.

A comprehensive review is presented of the development of a computer simulator for the Defense Communications System (DCS). The objective which has been accomplished provides the Defense Communications Agency (DCA) with a management tool to assist in the efficient planning, operation and engineering of the DCS. The computer programs were written for use on the Philco S 2000 computer and are currently being operated to provide solutions to real communication system problems. (Author)

6. DETECTION

AD-427 920 Div. 6
OTS price $3.60

Naval Air Test Center, Patuxent River, Md.
DETERMINATION OF SPECTRUM SIGNATURE OF RADIO SET AN/TPS-1D.
Final rept.,
by O. D. Stewart. 6 Aug 58, 12p.
Proj. NE050418
NATC 58 8 825 Unclassified report

Descriptors: (*Search radar, Microwave spectroscopy), Noise (Radar), Military requirements, Specifications, Radio interference, Filters (Electromagnetic waves), Pumping (Electronics), Radar equipment, Radiofrequency spectroscopy, Electromagnetic shielding, Measurement, Early warning systems.

Laboratory tests were conducted to determine the case radiation interference and spectrum interference and spectrum signature of Radio Set AN/TPS-1D, Serial No. 2. Measurements were made in accordance with Military Specification, MIL-I-16910A (SHIPS). The radiation interference was in excess of specification limits. It is recommended that steps be taken to reduce case radiation interference and that the harmonic frequency contents of the spectrum signature be filtered out. (Author)

AD-427 921 Div. 6
OTS price $4.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF SPECTRUM SIGNATURE OF RADAR SET AN/SPS - 6C.
Interim rept.,
by Demosthenes P. Choporis. 31 Jul 61, 1v.
Proj. SF0131504
NATC WST02 473 Unclassified report

Descriptors: (*Search radar, Microwave spectroscopy), Radiofrequency spectroscopy, Radar pulses, Radar transmitter, Test methods, Shipborne, Data processing systems.

Transmitter radiated pulse spectral shape measurements were performed for the tuned frequencies of 1255, 1300 and 1345 Mc of Radar Set AN/SPS-6C. The transmitter signal was sampled from the directional coupler in the transmission line between the radar transmitter and antenna. (Author)

AD-427 922 Div. 6
OTS price $19.75

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF SPECTRUM SIGNATURE OF RADAR SET AN/SPS-6C.
Final rept.,
by Kenneth H. Gerred. 11 May 62, 1v.
Proj. SF0131504
NATC WST5 310 Unclassified report

Descriptors: (*Radiofrequency spectroscopy, Measurements), Carrier controlled approach radar, Antenna radiation pattern, Test equipment, Search radar, Calibration, Tables, Shipborne, Microwave spectroscopy.

An investigation of Radio Set AN/SPS-6C spectrum signature was conducted. Additional measurements were made in accordance with the Model Validation Test Plan, Section I. (Author)

AD-427 927 Div. 6
OTS price $9.50

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF SPECTRUM SIGNATURE OF RADAR SET AN/TPS-15.
Final rept.,
by V. W. Williams, Oscar B. Horton and R. D. Cope. 15 Feb 63, 1v.
Proj. SF0131504
NATC WST4 87 Unclassified report

Descriptors: (*Radiofrequency spectroscopy, Measurement), Early warning systems, Search radar, Radar echo areas, Test equipment, Ranges (Distance), Antenna radiation pattern, Gain, Identification systems, Tables, Microwave spectroscopy.

An investigation of Radar Set AN/TPS-15 Spectrum Signature was conducted. This radar set was also used in conjunction with the AN/UPA-24A SIF Decoder to validate the Spectrum Signature Collection plan for IFF-Beacon System Measurements. (Author)

AD-427 928 Div. 6
OTS price $8.10

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF RADIO SET AN/TPS-1D SPECTRUM SIGNATURE.
Supplemental rept.,
by O. B. Horton. 6 May 63, 1v.
Proj. SF0131504
NATC WST4 272 Unclassified report

Descriptors: (*Radiofrequency spectroscopy, Measurements), Search radar, Radar echo area, Antenna radiation patterns, Gain, Test equipment, Ranges (Distance), Miscrowave spectroscopy.

Tests were conducted on Radio Set AN/TPS-1D at Webster Field, Maryland, to supplement the data obtained for NANEP report 62-9 titled ''Investigation of Radio Set AN/TPS-1D Spectrum Signature''. Receiver adjacent signal interference, receiver dynamic range, antenna patterns, antenna gain, and antenna VSWR were measured in accordance with MIL-STD-449A of 24 October 1961. (Author)

AD-428 284 Div. 6, 30
OTS price $3.60

Navy Electronics Lab., San Diego, Calif.
DIRECTIVITY FACTOR COMPUTER FOR ELECTROACOUSTIC TRANSDUCERS,
by C. E. Green and J. R. Roshon. 13 Sep 63, 32p.
NEL RR1196 Unclassified report

Descriptors: (*Analog computers, Sound signals), (*Sonar equipment, Electroacoustic transducers), (*Electroacoustic transducers, Sound signals), Integral equations, Recording systems, Measurement, Calibration, Recording paper, Sounding transmission.

A simple, low cost, portable computer was designed and constructed that provides a direct readout of the directivity factor of the spherical sound field of a sonar transducer. The instrument can also be permanently attached to the transducer calibration system, in which case it will provide the directivity factor while the regular evaluation is proceeding. The low cost and simplicity of operation of the directivity factor computer make it valuable for modern transducer evaluation. (Author)

AD-428 841 Div. 6, 30
OTS price $2.60

Electro-Mechanics Co., Austin, Tex.
STABILIZATION OF THE VARIABLE-MU MAGNETOMETER.
Final engineering rept. no. 1, 31 Mar 60-31 Mar 63,
by F. J. Morris and W. E. A. Ruska. 30 June 63, 18p.
Contract AF19 604 5520, Proj. 8601, Task 860102
AFCRL 63 939 1 Unclassified report

Descriptors: (*Magnetometers, Stabilization), Magnetic cores, Ferrites, Sensitivity, Temperature control, Magnetic materials, Transducers, Tests.

A magnetic detector exhibiting high sensitivity, high frequency response, ruggedness and a true component pattern of directivity will obviously find utility in many applications. Such a device is the Variable-Mu Magnetometer. The basic principle is described, and a brief description of the electronic circuitry used in these instruments is given. Several methods of stabilization are mentioned, and some of the many lab test are outlined. Two three-component, orthogonally placed sensors and related electronics systems were built using these techniques and were field tested. The characteristics of these instruments are discussed, methods of stabilization are compared, and conclusions are given. (Author)

AD-428 938 Div. 6, 12
OTS price $2.60

RCA Service Co., Inc., Patrick Air Force Base, Fla.
MOD IV RADAR PERFORMANCE ON MINUTEMAN LAUNCHES,
by D. E. Halter and A. E. Hoffmann-Heyden.
12 Feb 63, 24p. Rept. no. TM63 5
Contract AF08 606 5300
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Radar tracking), (*Guided missile tracking systems, Performance (Engineering)), X band, Radar equipment, Launching, Radar reflections, Radar echo areas, Exhaust gases, Wake, Radar signals, Attenuation, Guided missile ranges.

The AMR MOD IV (X-Band) Radars at Cape Canaveral have rendered consistently shorter than expected tracking coverages during MINUTEMAN missile launches. A rapid decay of the missile's reflectivity at aspect angles below 6 degrees was determined as the primary cause and is attributed to interaction by the exhaust flame. The trend of signal losses indicates that the MOD IV coverages on the MINUTEMAN missile cannot be increased by small improvements of the radar RF performance but rather by radar operation from locations which maintain aspect angles above 6 degrees. To demonstrate the MOD IV radar RF performance, tracks of the standard sphere were evaluated and compared with technically predicted capabilities. (Author)

AD-428 991 Div. 6
OTS price $1.60

Hartford U., Conn.
THE TRANSMISSION OF SOUND IN A MOVING FLUID.
6 Feb 64, 10p. Rept. no. 1
Contract Nonr430100, Proj. ONR NR185 802
Unclassified report

Descriptors: (*Sound transmission, Fluid flow), Motion, Sound signals, Attenuation, Test methods, Water, Instrumentation.

Techniques were developed for measuring sound in moving fluids. A basic closed loop recirculating system was designed which includes a centrifugal booster pump, a by-pass, and four similar parallel lines, each with a different test section. An acoustical signal is introduced into the stream of moving fluid by means of a transducer at one end of each of the four parallel lines. The velocity of the fluid and the frequency of the input signal are both controlled variables. After the signal has traveled through the full length of the test section, it is detected and its intensity measured by a device which also shows its wave pattern on an oscilloscope. Pertinent data gathered in this manner are recorded and later analyzed for specific purpose. A secondary object is to determine the validity of a theory that certain test elements will act as mufflers of sound in a moving fluid. The fluid in this first instance is water at room temperature. It is desired to know the extent of sound attenuation which might be realized by inserting a mechanical device into the moving stream without creating additional turbulence in the flow pattern. (Author)

AD-429 307 Div. 6
OTS price $3.60

Navy Electronics Lab., San Diego, Calif.
FCT, A NEW SEQUENTIAL DETECTION METHOD FOR MULTIPLE-RESOLUTION-ELEMENT RADAR,
by G. M. Dillard. 25 Oct 63, 33p.
NEL RR1201 Unclassified report

Descriptors: (*Radar receivers, Signal-to-noise ratio), Data processing systems, Radar signals, Resolution, Sequential analysis, Statistical analysis, Detection, Simulation, Radar.

New radar techniques are considered based upon statistical methods, which are applicable to automatic radar systems with increased detection capabilities. The specific phase reported here is the analysis by simulation of a new modified method of applying the sequential detection principle to multiple-resolution-element radar; the new method is designated FCT from Forced Continuation Testing. (Author)

7. ELECTRICAL EQUIPMENT

AD-428 050 Div. 7, 16
OTS price $5.60

Melpar Inc., Falls Church, Va.
BIOCHEMICAL FUEL CELL.
Quarterly progress rept. no. 5, 1 July-30 Sep 63, by Paul S. May, G. C. Blanchard and R. T. Foley. 30 Sep 63, 52p.
Contract DA36 039SC90878, Proj. 1G6 22001A053 04
Unclassified report

Descriptors: (*Fuel cells, Microorganisms), (*Hydrogen, Production), (*Microorganisms, Mutations), (*Biochemistry, Fuel cells), Culture media, Grasses, Clostridium, Pseudomonas, Biochemistry.

Screening studies were conducted on strains of Clostridium welchii and certain Pseudomonads related to metal corrosion in hydrocarbon fuel systems. These new strains produced hydrogen at rates higher than any organisms so far investigated. The gas generating system was scaled up to 10 liters and in this larger system Clostridium welchii (6785) produced H2 at the rate of 8.2 liters/hr. The genetic work, designed to develop mutants with outstanding hydrogen generating capability was initiated with the development of a simple plate technique for selection of desirable mutants. A literature survey of potential cheap, available substrates suitable for field use was made with the starch and sugar content of various materials being tabulated. The possibility of using hydrocarbons is considered. The rate of hydrogen production observed on this program is expressed in terms of fuel cell consumption to make a rough preliminary appraisal of the biochemical fuel cell. (Author)

AD-428 052 Div. 7, 4
OTS price $4.60

Electrochimica Corp., Menlo Park, Calif.
DIRECT AMMONIA-AIR FUEL CELL.
Quarterly rept. no. 1, 1 July-1 Oct 63, by Robert E. Kuppinger. 1 Oct 63, 1v.
Contract DA36 039AMC03245E, Task 1G6 22001A053 04
Unclassified report

Descriptors: (*Fuel cells, Ammonia), (*Ammonia, Dissociation), Electrochemistry, Decomposition, Catalysts, Iron, Potassium compounds, Hydroxides, Oxides, Nickel, Porosity, Air, Platinum, Electrolytes, Sodium compounds, Magnesium compounds, Electrodes, Nickel compounds.

Electrochemical parameters were investigated for a new type intermediate temperature direct ammonia fuel cell. Effects of temperature and composition were studied. Single electrode potentials were measured by means of a nickel-nickel oxide reference electrode. Experimental problems related to difficulties in sealing cells and to electrode flooding are discussed. Theoretical aspects of the ammonia decomposition problem are analyzed. A systematic study plan is discussed. (Author)

AD-428 218 Div. 7, 30
OTS price $1.60

Institute for Defense Analyses, Washington, D. C.
AIEE PHOTOVOLTAIC SOLAR SIMULATOR SPECIFICATION, by R. C. Hamilton. Mar 62, 6p. TN62 10; UBG62 341
Contract SD50
Unclassified report

Descriptors: (*Solar radiation, Simulation), Specifications, Solar cells, Tests, Incandescent lamps, Infrared filters, Calibration, Intensity.

The AIEE Solar Simulator Specification represents a reasonable compromise at the present time between the desires of solar power engineers for accurate solar radiation simulation and the present state-of-the-art in lamps, filters, and radiometric instrumentation. This specification has served as a starting point for the development of solar simulators by several companies and their increasingly widespread use for photovoltaic converter performance testing. This specification should be reviewed annually be interested technical groups such as the Solar Working Group of the Interagency Advanced Power Group to make recommendations to the AIEE regarding revisions in accordance with advances in solar simulator and radiometric technology. (Author)

AD-428 438 Div. 7
OTS price $2.60

American Monarch Corp., Minneapolis, Minn.
MULTI-STATION PUSH BUTTON SWITCH.
Interim development rept., 1 Oct-31 Dec 63. 31 Dec 63, 20p.
Contract NObs89440, Proj. SR0080302, Task 9633
Unclassified report

Descriptors: (*Electric switches, Design), Configuration, Construction, Seals (Stoppers), Rotary switches, Scheduling, Fastenings.

The teaseproof switch mechanism was fully developed and three and eleven station prototypes were built. All facets of the teaseproof mechanism design work satisfactorily. The lighted button was also developed in conjunction with the seal. A prototype button and light unit was built to determine any potential trouble areas. The seal has been designed but no prototype units can be constructed. The seal and button design required more time to develop than was originally estimated and will delay the completion date scheduled for phase one. (Author)

AD-428 461 Div. 7
OTS price $7.60

Bright Star Industries, Clifton, N. J.
MAGNESIUM FLAT CELL BATTERIES.
Final rept., 30 Sep 58-30 Oct 63, by Richard A. Pette. 30 Oct 63, 1v.
Contract DA36 039sc78231, Task 1G6 22001A053 02
Unclassified report

Descriptors: (*Batteries and components, Dry cells), (*Dry cells, Magnesium), Manufacturing methods, Anodes, Zinc, Electrolytes, Magnesium compounds, Bromides, Corrosion inhibition, Pickling compositions, Resistance (Electrical), Reduction, Zinc coatings, Performance (Engineering), Storage, Humidity, Tropical tests, Cathodes, Manganese compounds, Oxides, Carbon black, Barium compounds, Chromates, Hydrogen, Production, Pressure, Rupture, Containers.

Development of a Mg/MgBr2/MnO2 flat cell battery was undertaken. Areas of investigation that received special attention were conductive coating of magnesium alloys, cathode mix formulations, duplex electrode and cell assembly techniques. Increased capacity was obtained through adequate venting of hydrogen gas and proper choice of sealing materials. Capacity data on the effects of various parameters studied were obtained. (Author)

AD-428 532 Div. 7, 12, 20
OTS price $5.60

General Electric Co., Schenectady, N. Y.
TRANSIENT ANALYSIS OF THE NIKE X STEAM POWER

PLANT.
Final rept.
Jan 64, 1v. Rept. no. TIS 63GL142
Contract DA49 129eng519
Unclassified report

Report on Nike X Conventional and Nuclear Steam Power Systems Study. Volume 4. Power systems transient analysis.

Descriptors: (*Steam power plants, Nuclear power plants), (*Nuclear power plants, Steam power plants), (*Transients, Electric power production), Launching sites, Guided missiles (Surface-to-air), Electric potential, Design, Electric power production, Boilers, Steam turbines, Power plants (Establishments), Circuits, Generators, Voltage regulators, Control systems, Analog computers, Electrical properties, Performance (Engineering), Piping,

Contents: System Mechanization; Electrical System Requirements (generator, turbine and speed control, and transient performance computer simulation), Steam System Requirements (thermal system requirements, piping and steam storage in the piping, boiler controls, boiler dynamic characteristics, boiler dynamic simulation, and boiler transient performance), Summary of Requirements (generator and regulator, and turbine and control) boiler and auxiliaries, boiler controls, and electrical specifications.

AD-428 659 Div. 7, 12
OTS price $1.10

Institute for Defense Analyses, Washington, D. C.
BATTERY RESEARCH,
by N. W. Snyder. 19 Apr 61, 10p.
IDA TN61 7, UBG61 160
Unclassified report

Descriptors: (*Power supplies, Scientific research), (*Storage batteries, Scientific research), (*Primary cells, Scientific research), Electrolytes, Low temperature batteries, Thermal batteries, Battery separators, Spacecraft, Nickel, Cadmium.

Although some research and development has occured in battery work both in primary and secondary for many years, the efforts in development work have greatly exceeded research (of a basic nature). There is increased interest in DOD for new energy sources. In proportion to their usefulness, battery research has received little attention until recently when there appeared serious shortcomings on the reliability of Ni-Cd batteries for space vehicles. A proper research program could produce great improvement. (1) The present Ni-Cd battery has a theoretical limit of 95 watt-hr/lb, a practical limit of 25 to 30 watt-hr/lb and a present status of 1 to 5 watt-hr/lb in space vehicles. (2) The sealed rechargeable AgO-Zn battery has a practical potential of 35 watt-hr/lb for space use but has not been realized. (3) The alkali metal Halogen primary battery system has a potential of 250-500 watt-hr/lb but has never been pursued. (Author)

AD-428 690 Div. 7, 31
OTS price $1.10

Naval Applied Science Lab., Brooklyn, N. Y.
CATHODIC PROTECTION PERFORMANCE OF LEAD-ALLOY ANODES AT ALTERNATE HIGH AND LOW VELOCITIES,
by I. Geld. 4 Feb 64, 6p.
Proj. SR007 08 07, Task 1203
NASL TM1; 9400 33 Unclassified report

Descriptors: (*Anodes, Lead alloys), Silver, Lead, Velocity, Sea water, Tests, Test equipment.

AD-428 704 Div. 7, 12
OTS price $6.60

Naval Ordnance Lab., Corona, Calif.
LIQUID AMMONIA RESERVE BATTERIES FOR GUIDED MISSILE FUZING. FEASIBILITY STUDY.
Final rept.,
by William C. Spindler and John C. Daley.
30 Dec 63, 63p.
NAVWEPS 8178 Unclassified report

Descriptors: (*Guided missile batteries, Guided missile fuzes), (*Guided missile fuzes, Guided missile batteries), Liquefied gases, Ammonia, Electrolytes, Power supplies, Electrochemistry, Feasibility studies, Magnesium, Ammonium compounds, Potassium compounds, Thiocyanates, Silver, Oxidizers, Aromatic compounds, Nitrates, Sulfur compounds.

The feasibility of a liquid ammonia experimental battery has been established for short-life, reserve primary applications, and all attributes required for service in guided missile fuzes have now, for the first time, been demonstrated in a single package. The battery delivers the full electrical output under all environmental conditions and meets the volume limitation, including space for the selfcontained activator mechanism. (Author)

AD-428 999 Div. 7
OTS price $5.60

Heliotek Div., Textron Electronics, Inc.,
Sylmar, Calif.
HIGH EFFICIENCY SILICON SOLAR CELLS.
Quarterly progress rept. no. 5, 15 June-15 Sep 63,
by Paul A. Berman. Oct 63, 1v.
Contract DA36 039sc90777, Proj. 1GC22001A053 03
Unclassified report

Descriptors: (*Solar cells, Silicon), (*Silicon, Solar cells), (*Energy conversion, Solar cells), Crystals, Diffusion, Design, Coatings, Silicon compounds, Oxides, Resistance (Electrical), Costs, Statistical analysis.

Some additional statistical analyses of the first N(+)P bivariable experiment were made. The variance on this experiment was greater from run to run than within a run, at any given design point. A preliminary statistical experiment was performed on N(+)P cells having between 5 and 27 grid lines with diffusion times of 20 and 80 minutes. Half the cells were coated with SiO while half were not. Experimental results showed a flat optimum between 9 and 18 grid lines, and between the diffusion times of 20 and 80 min. With regard to the latter variable, the relative insensitivity of N(+)P cell efficiencies, as compared to P(+)N cell efficiencies, with variation of junction depth was again observed, and this insensitivity caused some difficulty in determining a clear superiority of one diffusion time over the other due to the masking effects of other variables. Cells having total cell series resistances of less than 0.20 ohms were fabricated. Polycrystalline cells showed sunlight conversion efficiencies of as high as 11%. (Author)

AD-429 063 Div. 7
OTS price $4.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
FURTHER INVESTIGATIONS OF POROUS FLOW-THROUGH ELECTRODES OF PLATINUM BLACK,
by P. Palasi and L. G. Austin. Aug 63, 1v.
Rept. no. 5
Contract DA49 186 5020RD917
Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Porous materials), (*Platinum, Electrodes), Electrolytes, Fuels, Alcohols, Esters, Carbonyl groups, Polarization, Thickness, Tin, Sulfuric acid, Potassium compounds, Hydroxides, Electric currents.

Further tests were made on the porous, flow-through electrodes described previously. It was confirmed that for methanol, formaldehyde and formate at high current densities, the observed limiting currents are considerably less than the theoretical values. The same electrodes using the stannous-stannic couple as reactant gave exact agreement between the observed and limiting current. It is concluded that the limiting factor present for the hydrocarbon fuels is not a mass transport factor. In general, the theoretical predictions of the effect of flow-rate, concentration, etc., on the polarization curves are valid at lower current densities, but fail near the region of the abnormal limiting current. (Author)

AD-429 135 Div. 7
OTS price $21.00

Inland Testing Labs., Dayton, Ohio.
ALKALINE BATTERY EVALUATION.
Semi-annual rept. no. 6, 30 June 60-16 Sep 63, by W. W. Clark, W. G. Ingling, I. F. Luke and E. A. Roeger, Jr. Dec 63, 352p.
Contracts AF33 616 7529, AF33 657 8450, Proj. 8173, Task 817304
RTD TDR63 4144 Unclassified report

RTD-TDR-63-4144 supersedes ASD-TDR-394, AD-411 245.

Descriptors: (*Batteries and components, Alkaline cells), (*Alkaline cells, Spacecraft), (*Storage batteries, Performance (Engineering)), Tests, Silver, Cadmium, Zinc, Nickel, Failure (Mechanics), Electrolytic cells, Life expectance, Radiation damage, Space environmental conditions, Experimental data, Electric potential, Test facilities, Electric currents.

The first six semi-annual periods of an alkaline battery applied research and failure analysis program. The purpose of this program is to establish a broadbase of battery test data for use in the design of the electrical system of future space vehicles, and to determine the actual failure mechanism of new battery systems under varying environmental and cycle-life conditions so that improved space batteries can be developed. Another objective is to determine techniques and/or materials to prevent these failures, while at the same time increase the usable watt-hours-per-pound capability and cycle life of the battery. The program, to date, includes the cycle-life performance evaluation and failure analysis of the following types of sealed, secondary, alkaline cells: One type of 12-ampere-hour nickel-cadmium cells, and two types of 20-ampere-hour nickel-cadmium cells, three types of 15-ampere-hour silver-cadmium cells; and three types of 25-ampere-hour silver-zinc cells. The program also includes a study of the effects of radiation upon all three types of alkaline cells. (Author)

AD-429 136 Div. 7
OTS price $8.10

Westinghouse Electric Corp., Dayton, Ohio.
DENDRITIC SILICON SOLAR CELL PANEL.
Final rept., Aug 62-Aug 63, ed. by K. S. Tarneja and V. A. Rossi. Oct 63, 80p.
Contract AF33 657 9820, Proj. 8173, Task 817301 29
RTD TDR63 40 30 Unclassified report

Descriptors: (*Solar cells, Manufacturing methods), (*Solar panels, Silicon), (*Silicon, Solar cells), Thermal expansion, Acceleration, Vibration, Shock (Mechanics), Physical properties, Energy conversion, Diffusion, Optical properties, Life expectancy, Design, Tests, Test equipment.

Studies directed toward the fabrication of high efficiency solar cells on silicon webbed dendrites and the solar cell panels were undertaken. Some of the basic design considerations and fabrication techniques are presented. Preparation of P(+)N and N(+)P solar cell structure is discussed. Cell efficiencies were measured using two tungsten photoflood lamps as the light source. Efficiencies as high as 13% were achieved on 2cm x 1cm x 0.05cm, as high as 12% were achieved on 15cm x 1cm x 0.05cm, and as high as 10% were achieved on 30cm x 1cm x 0.05cm solar cells prepared from silicon webbed dendrites. Spectral response measurements were made on silicon web solar cells and typical curves are presented. One mechanical sample, four operational solar cell panels, and two special operational panels were fabricated, tested and submitted in part fulfillment of the subject contract. Complete results on these panels are discussed. (Author)

AD-429 191 Div. 7
OTS price $2.60

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly progress rept. no. 1, 1 July-30 Sep 63, by D. J. Doan and L. R. Wood. 31 Oct 63, 23p.
Rept. no. 13
Contracts DA36 039AMC02173E, DA36 039SC89188, DA Proj. 1G6 22001A053 02
Unclassified report

Descriptors: (*Batteries and components, Ammonia), (*Ammonia, Liquefied gases), (*Manufacturing methods, Batteries and components), Wet cells, Electrolytes, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Porosity, Potassium compounds, Thiocyanates, Silver compounds, Chlorides, Gases, Electrodes, Zinc, Magnesium, Electrolytic cells, Feasibility studies.

Considerable progress has been made concerning elucidation of existing problems through use of factorial design of experiments as well as use of conventional test methods. A re-usable multicell test fixture has been developed which increases the number of multicell tests possible per unit time. Investigation of the hot battery failure mode has led to the disclosure of a gassing reaction at the cathode. This information was obtained through use of reference cells which denoted the limiting plate and through use of clear plastic cell blocks which enabled observation of gassing action. Cause of this phenomenon has not been isolated or corrected as yet. Correction of this difficulty should result in much improved multicell performance. (Author)

AD-429 248 Div. 7, 4
OTS price $1.00

Electrochemistry Research Lab., Western Reserve U., Cleveland, Ohio.
KINETIC FACTORS IN FUEL CELL SYSTEMS: THE OXYGEN

ELECTRODE,
by Ernest Yeager and Akiya Kozawa. 15 Jan 64, 33p. Rept. no. TR17
Contract Nonr239100, Proj. NR359 277
Unclassified report

Descriptors: (*Fuel cells, Cathodes (Electrolytic cells)), (*Cathodes (Electrolytic cells), Fuel cells), (*Oxidation-reduction reactions, Fuel cells), Electrodes, Porous materials, Carbon, Graphite, Platinum, Nickel compounds, Oxides, Surface properties, pH, Electrolytes, Polarization, Thermodynamics, Hydrogen peroxide, Oxygen, Acids, Bases (Chemistry).

Experimental studies of the reduction of oxygen on porous carbon and metal electrodes of the types used as cathodes in aqueous fuel cells support the conclusion that the reduction proceeds through a peroxide intermediate. While the reduction of molecular oxygen to peroxide in alkaline solutions is characterized by relatively low polarization on most cathodes in aqueous low temperature fuel cells, the subsequent reduction of the peroxide usually is irreversible. An immediate consequence is that most low temperature fuel cells, even at low current densities, operate at substantially less than the cell voltage perdicted thermodynamically. Results of studies of the oxygen-peroxide couple on carbon, graphite, lithiated nickel oxide, and platinum are summarized with emphasis on the dependence of the results on electrode composition, surface preparation, pH, and electrolyte composition. Some of the implications of these fundamental studies in the optimization of oxygen cathodes for aqueous fuel cells are discussed. (Author)

AD-429 290 Div. 7
OTS price $2.60

Rocketdyne, Canoga Park, Calif.
HIGH-ENERGY BATTERY SYSTEM STUDY.
Quarterly progress rept. no. 1, 1 July 30 Sep 63, by J. Farrar, R. Keller and C. J. Mazac. 30 Sep 63, 25p. Rept. no. R5405 1
Contract DA36 039AMC03201E, Proj. 1G6 22001A053 0:
Unclassified report

Descriptors: (*Batteries & components, Primary cells), (*Primary cells, Electrolytes), Electrodes, Electrical conductance, Organic solvents, Alkenes, Carbonates, Sulfoxides, Nitriles, Amides, Alkanes, Vapor pressure, Electrolytic cells, Polarization.

Work accomplished consisted of purifying solvents, determining the conductance and physical characteristics of electrolytes, and making half-cell studies. In some instances the specific conductance of electrolyte solutions exceeds 0.02 mho/cm, but ion solvation appears to limit the attainment of high conductance values. Measured electrode potentials were steady and approximated expected values, but in the first tests appreciable polarization took place under current loads. (Author)

AD-429 322 Div. 7
OTS price $9.10

Aerospace Research, Inc., Boston, Mass.
INVESTIGATION OF LIGHTWEIGHT PORTABLE BATTERY CHARGER TECHNIQUES.
Quarterly progress rept. no. 1, 15 June-30 Sep 63, by Robert B. Craven. 28 Oct 63, 101p. Publication no. 167
Contract DA36 039AMC02330E, Task 166 22001A053 05
Unclassified report

Report on Portable Battery Chargers.

Descriptors: (*Battery chargers, Portable (Man-portable)), Electric potential, Electric currents, Capacitors, Energy conversion, Power, Circuits, Transistors, Rectifiers, Switching circuits, Mathematical analysis, Integral equations.

Various power conversion and control schemes are considered from the viewpoint of general applicability to the area of lightweight portable battery chargers. Several battery charging methods are described. An analysis is made indicating that maximum charging efficiency and minimum charging time are mutually exclusive conditions; a decrease in charging time must be achieved at the expense of decreased efficiency. Several possible charging current waveforms are compared from the standpoint of obtaining maximum control device utilization and optimum circuit efficiency. This waveform comparison is made in terms of ratios of peak to average values and mean-squared to squared average values. A detailed analysis of the a-c conduction angle controlled charger is made and the results of the analysis presented in terms of the various significant circuit parameters. A novel transformerless DC/DC voltage doubler circuit is described. A resonant charging circuit has been developed in which several hundred watts of power are transferred to the battery through a load winding magnetically-coupled to an inductor in a series-resonant circuit. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-427 929 Div. 8
OTS price $9.10

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF RADIO SET AN/TPS-ID SPECTRUM SIGNATURE.
Final rept.,
by Herbert M. Reid and V. M. Williams. 28 Feb 62, 1v.
Proj. SF013504
NATC WST5 149 Unclassified report

Descriptors: (*Search radar, Radiofrequency spectroscopy), (*Radar interference, Search radar), Radar receivers, Early warning systems, Moving target indicators, Sensitivity, Radar signals, Radar antennas, Parabolic antennas, Installation, Radar equipment, Continuous-wave radar, Frequency modulation, Radiofrequency oscillators, Radar transmitters, Radar pulses.

Contents: Transmitter tests - Power output, Spurious emission, Emission spectrum, Modulation characteristics, Carrier frequency stability; Receiver tests - Sensitivity, Selectivity, Spurious response, Overall susceptibility test, Intermodulation test, Adjacent signal interference, Pulse desensitization, CW desensitization, Dynamic range. Oscillator radiation.

AD-427 935 Div. 8
OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
TECHNICAL EVALUATION OF TEST ANTENNA CABLE PICKUP OF RADIATED ENERGY.
Final rept.,
by K. H. Gerred. 14 May 63, 7p.
NATC WST4 312 Unclassified report

Descriptors: (*Coaxial cables, Electromagnetic shielding), Tests, Antenna components, Impedance matching, Ultrahigh frequency, Superhigh frequency, Electromagnetic waves.

Tests were conducted to evaluate antenna coaxial cable pickup of radiated energy in the 1 to 10 kmc range. Cable types RG-8A/U and RG-9B/U were tested to determine their susceptibility to pickup of radiated microwave energy. It was concluded that RG-9B/U is virtually unaffected when properly terminated. RG-8A/U is extremely susceptible to pickup of microwave energy.

AD-427 936 Div. 8
OTS price $4.60

Naval Air Test Center, Patuxent River, Md.
DETERMINATION OF SPECTRUM SIGNATURE OF RADIO SET AN/TPS-ID.
Supplementary rept.,
by C. L. Lennon and D. P. Choporis. 11 Dec 59 1v.
Proj. NE050418
NATC ET12 499 Unclassified report

Descriptors: (*Search radar, Radiofrequency spectroscopy), (*Radar receivers, Sensitivity), Early warning systems, Continuous wave radar, Moving target indicators, Radar interference, Radar antennas, Parabolic antennas, Measurement, Gain, Radar transmitters, Broadband.

Receiver susceptibility, conducted interference, and spectrum measurements were made for Radio Set AN/TPS-1D. The conducted interference was in excess of specification limits. It is recommended that line filters be installed to reduce conducted interference. It is further recommended that research be continued to improve the measuring techniques. (Author)

AD-428 000 Div. 8, 1
OTS price $2.75

Chance Vought Corp., Dallas, Tex.
INVESTIGATION OF CONTACTLESS SWITCHING CONCEPTS FOR APPLICATION TO AIRCRAFT ELECTRICAL SYSTEMS. VOLUME III. SYSTEM INVESTIGATIONS AND DEVELOPMENTAL REQUIREMENTS.
Final engineering rept., phase 3, 11 June 62-11 July 63,
by L. D. Dickey, A. J. Marek and W. M. Drum.
11 July 63, 120p. Rept. no. 2 53727 3R449 3
Contract NOw62 0944c
Unclassified report

Descriptors: (*Switching circuits, Aircraft equipment), (*Semiconductor devices, Aircraft equipment), Electronic switches, Reliability (Electronics), Maintainability, Feasibility studies, Electronic relays, Toggle switches, Printed circuits, Transistors, Microminiaturization (Electronics), Power supplies, Specifications.

A system design philosophy was established for aircraft electrical systems utilizing contactless switching concepts that would provide the necessary power switching, protection and control functions for present and anticipated aircraft requirements. System design and operation, packaging, and assembly and installation requirements were investigated from the aircraft system designer's viewpoint. Design criteria and performance goals are presented for the various components to be used in the contactless switching system. A development program plan is presented. (Author)

AD-428 005 Div. 8, 14, 25
OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
BETA-SILICONE CARBIDE AND ITS POTENTIAL FOR DEVICES.
Final rept.,
by W. E. Nelson, F. A. Halden and A. Rosengreen.
31 Dec 63, 43p. Rept. no. 21
Contract NObsr87235, Projs. SR0080303, SRI PMU3978, Task 9356
Unclassified report

Descriptors: (*Silicon compounds, Carbides), (*Carbides, Silicon compounds), (*Single crystals, Semiconductor devices), (*Semiconductor devices, Single crystals), Nitrogen, Contamination, Crucibles, Graphite, Impurities, Crystal growth, Luminescence, Diodes (Semiconductors), Experimental data.

AD-428 020 Div. 8, 26
OTS price $2.60

Tung-Sol Electric, Inc., Bloomfield, N. J.
HIGH SPEED POWER AMPLIFIER USING ELECTRON BEAM SWITCHED P-N JUNCTIONS.
Interim development rept., 27 Sep-26 Dec 63.
17 Jan 64, 24p.
Contract NObsr89493, Proj. SR0080304, Task 9293
Unclassified report

Descriptors: (*Pulse amplifiers, Electron beams), (*Diodes (Semiconductor), Pulse amplifiers), (*Electron beams, Pulse amplifiers), Electron tubes, Electron guns, Temperature, Power, Heat exchangers, Silicon, Cathodes (Electron tubes), Electrical potential, Electric current, Aluminum, Production, Power amplifiers.

Experimental electron beam multiplier (EBM) tubes have been made in which a diode pulse current of 2.0 amperes was obtained at 50 to 140 volts for a passivated silicon diode without heat sink,

and 4.0 amperes at 200 to 220 volts for bare junction silicon diode with heat sink. These values were obtained at less than rated beam current for the EBM. The anode potential was in the order of 20 KV. The pulse repetition rate was 100 pps. The pulse duration was approximately 1 microsecond. An electron gun has been designed for the EBM tube to give 5 ma beam current, a cut-off voltage of less than 20 volts and a transconductance of 900 to 1100 micromhos. The heat sink design has been modified to facilitate diode assembly. Thermal resistance measurements indicate that the heat sink should adequately dissipate 60 watts of power with no more than a safe temperature rise to 148 C. (Author)

AD-428 040 Div. 8
OTS price $3.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE GENERAL PURPOSE.
Quarterly progress rept. no. 17, July-Sep 63,
by Jerome G. Burns. Sep 63, 38p.
Contract DA36 039sc81283
Unclassified report

Descriptors: (*Fixed resistors, Manufacturing methods), Production, Encapsulation, Impregnation, Tests, Life expectancy, Temperature, Moistureproofing.

Efforts were continued on the establishment of a production facility for the manufacturing 1/4-watt and 12-watt fixed film resistors. A series of experiments was run to determine the effect of mold jacket impregnants upon performance. It was decided to retest the 100 K ohm and .27 megohm Pilot Run units using a DAP impregnation treatment. Performance of the DAP impergnated 100 K ohm and .27 megohm units after 500 hours load life testing is superior to that of non-impregnated units. Testing of other units continued. (Author)

AD-428 049 Div. 8, 7
OTS price $2.60

Western Electric Co., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 19, 25 Aug-25 Nov 63,
by J. B. Rawls. 25 Nov 63, 17p.
Contract DA36 039SC81268
Unclassified report

Descriptors: (*Capacitors, Manufacturing methods), (*Manufacturing methods, Production), Failure (Mechanics), Heat treatment, Vacuum, Polyester plastics, Cellulose acetates, Coatings, Life expectancy, Dielectrics, Metal coatings.

Continued difficulty has been encountered in producing the 750 1.0 mfd polycarbonate capacitor pilot run. Two lots of approximately 800 polycarbonate capacitors each were produced. Both lots had poor yields due to shorting at the clearing operation. A large number of those capacitors which survived the clearing operation had poor IR's and poor Q's. Failure analysis has revealed a number of possible causes and remedial actions are being taken to improve quality and yields. The exact cause or causes for poor yields has not been fully determined as yet and effort continues in this direction. (Author)

AD-428 051 Div. 8, 26
OTS price $4.60

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
A DEVELOPMENTAL STUDY OF A HIGH FREQUENCY UNIPOLAR FIELD EFFECT TRANSISTOR,
by L. Ragle and M. Purnaiya. Sep 63, 35p.
Contract AF33 657 8718, Proj. 4460, Task 446001
RTD TDR63 4206 Unclassified report

Descriptors: (*Transistors, Electric fields), (*Manufacturing methods, Production), Electrical impedance, Capacitance, Silicon, Gallium, Diffusion, Oxides, Etched crystals, Performance (Engineering), Radiofrequency, Admittance, Gain, Electric potential.

The design, construction, and performance of a very small active area field effect transistor are presented. It was desired to make a high 100 Mc. input impedance, high transconductance field effect transistor. The input impedance at 100 Mc. is predominantly capacitive, and high input impedance is obtained by making the device area as small as possible. High transconductance is sought by making an interdigitated structure. The important experimental design considerations taken into account, together with fabrication problems which arose during the FET development, are discussed. Also discussed are those factors which influenced yield, the most important of which were the photolithographic steps. The d. c. electrical characteristics obtained with two different geometries of field effect devices are discussed. These characteristics are related to the device geometry and diffusion structure to the extent that this is possible. The high frequency characteristics of the device in terms of Y matrix characterization are noted. An equivalent circuit model is derived, and performance compared with design objectives. (Author)

AD-428 055 Div. 8, 25, 15
OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
COUPLED MODE THEORY FOR ADVANCED MICROWAVE DEVICES.
Interim rept. no. 7,
by M. C. Pease and C W. Barnes. Jan 64, 61p.
Contract AF33 657 8343, Proj. 4052
Unclassified report

Descriptors: (*Microwave equipment, Numerical analysis), (*Algebras, Theory), Harmonic analysis, Perturbation theory, Sequential analysis, Matrix algebra.

A study whose purpose is to develop and apply a generalized theory of the coupling of the modes of propagation such as occur in distributed microwave devices is presented. A discussion is presented of periodic transmission systems and show how the Floquet theory can be formulated in terms of the language and concepts of coupled mode theory. The theory of coupled mode transmission systems with random coupling is extended to cover the case of a resonant transmission line. The analysis shows how random perturbations in the line scatter energy over the various resonant modes of the system. A class of nonuniform systems is considered, i.e., those described by a matrix, W, whose derivative is expressible as the commutator of W and some matrix S(z). A set of scalar invariants of the system that are obtained from the properties of the under-lying Lie algebra, and so are independent of the precise form of S(z) is developed. Some of the simpler algebras are given as examples and some of their scalar invariants--in the sense given above--are derived. A numerical example is given to illustrate generally the power of Lie algebraic methods. (Author)

AD-428 056 Div. 8
OTS price $1.60

Microwave Electronics Corp., Palo Alto, Calif.
ONE-WATT CW S-BAND TRAVELING-WAVE TUBE WITH 6 DB NOISE FIGURE.
Dec 63, 14p.
Contract AF30 602 3025, Proj. 5573, Task 557301
RADC TDR63 462 Unclassified report

Descriptors: (*Traveling wave tubes, S band), Cathodes (Electron tubes), Oxides, Performance (Engineering), Noise (Radar), Gain, Electron tube heater, Electric potential, Nickel alloys, Oxide cathodes.

Activity of oxide-coated cathodes for use in a high-power low-noise tube is studied. Several diodes have been built employing active cathodes and have exhibited very encouraging data. Current densities on the order of 1.5 amps/sq.cm. (CW) have been obtained at normal operating temperatures (700 C). Since the cathode is one of the most important factors in low-noise tubes, careful attention must be given to processing and techniques if cathode activity is to be increased from that of a conventional oxide-coated emitter. Revised techniques for processing tubes with active cathodes have been instituted. Four vacuum envelope assemblies were fabricated. Two assemblies developed vacuum leaks at the pin seal. The third assembly developed a vacuum leak at the tube pinch-off after removal from the exhaust station. RF data were taken on the fourth tube, which exhibited a minimum noise figure of 5.3 db (uncorrected) at 2.8 Gc, at 5 ma cathode current. The saturated power output at 4 ma was 200 mW. (Author)

AD-428 077 Div. 8, 25, 26
OTS price $8.60

Raytheon Co., Waltham, Mass.
HIGH FREQUENCY TUNNEL DEVICE STUDY.
Final technical rept.,
by S. R. Steele, W. Feist, J. Lavine and J. Oberly. June 63, 1v.
Contract AF30 602 2673, Proj. 4506, Task 450602
RADC TDR63 321 Unclassified report

Descriptors: (*Semiconducting films, Transistors), (*Transistors, Semiconducting films), (*Cathodes (Electron tubes), Traveling wave tubes), Manufacturing methods, Power, Gain, Microwave frequency, Aluminum, Gold, Metal films, Evaporation, Production, Emissivity, X band, Solid state physics, Physical properties, Dielectrics, Life expectancy.

The specific objective of this program has been to investigate methods of achieving low noise amplification at microwave frequencies utilizing tunneling through thin films. The design goals were 20 db gain, 6 db noise figure at 10 kMc, with a 1 kMc bandwidth. Two alternate approaches to achievement of these goals were investigated as concurrent phases. Phase I was aimed at attaining the requisite amplification using an all solid-state device; whereas Phase II was directed towards utilizing a thin film cathode in conjunction with a microwave structure. The design goals were not attained by the end of the program, but the relative feasibility of the approaches was demonstrated. It was determined that the tunnel cathode is promising for its application. (Author)

AD-428 087 Div. 8, 30, 15
OTS price $11.00

Adaptronics, Inc., Alexandria, Va.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS. VOLUME III. MONOTYPE SYSTEM THEORY AND CONSIDERATIONS FROM AUTOMATA THEORY.
Final rept., 15 Oct 61-14 Oct 62,
by L. O. Gilstrap, Jr., M. J. Pedelty and R. J. Lee. Dec 63, 141p.
Contract AF33 657 7100, Proj. 1 7 4160, Task 416004
ASD TDR63 664, vol. 3 Unclassified report

Descriptors: (*Teaching machines, Mathematical analysis), (*Computer logic), Computers, Cybernetics, Memory, Pattern recognition, Probability, Networks, Communication theory, Switching circuits, Mathematical logic.

The subject of probability state variable systems is examined from two points of view. The first point of view is that of automata theory and the problems of automaton environment interaction is discussed. Secondly, a detailed structural model of a generalized switching device is formulated and the major problems of interest in the theory of monotype probability state variable systems are described. Novel mathematical methods for determining properties of the probability state variable device are developed. An index notation for logic problems is presented and some of the general properties of switching networks are analyzed using this notation. (Author)

AD-428 089 Div. 8, 26
OTS price $2.60

Raytheon Co., Lewiston, Maine.
PRODUCTION ENGINEERING MEASURE ON SILICON ALLOY TRANSISTORS.
Quarterly rept. no. 5, 1 July-30 Sep 63,
by R. W. Jones, A. W. Postlethwaite and L. F. Leary. 30 Sep 63, 24p.
Contract DA36 039SC86744
Unclassified report

Descriptors: (*Transistors, Silicon), Manufacturing methods, Reliability (Electronics), Crystal structure, Etched crystals, Soldering, Chemical milling, Vacuum Apparatus, Seals (Stoppers), Life expectancy, Nondestructive testing, Temperature.

Centering of the silicon resistivity specification is described with parameter distributions. Introduction of X-ray orientation, I. D. slicing and variably indexed scribing is discussed. A modified rinsing tank with electrolytic monitoring was introduced into production. The feasibility of the use of a thermographic phosphor to monitor burn-in racks was demonstrated as a reliable production technique. Power step-stress was used to monitor the improvement of production product. (Author)

AD-428 110 Div. 8, 6
OTS price $4.60

Westinghouse Electric Corp., Baltimore, Md.
RADAR MAPPING SURVEILLANCE SET AN/APQ-97(XE-1).
Addendum to final engineering rept., 1 Sep-30 Nov 63.
Dec 63, 1v. Rept. nos. A18006AB3T, 481A1A
Contract DA36 039sc87259, DA Task 1G6 40903D505 04
Unclassified report

Report on supplementary servo data for the AN/APQ-97(XE-1) antenna system.

Descriptors: (*Search radar, Mapping), Radar equipment, Servo amplifiers, Radar antennas, Performance (Engineering), Airborne, Stabilization, Tests, Servomechanisms, Yaw, Pitch (Motion).

AD-428 156 Div. 8
OTS price $9.60

Colorado U., Boulder.
THEORETICAL CALCULATIONS OF THE IMPEDANCE OF A MONOPOLE ANTENNA WITH A RADIAL-WIRE GROUND SYSTEM ON AN IMPERFECTLY CONDUCTING HALF-SPACE,
by S. W. Maley, R. J. King and L. R. Branch.
13 Dec 63, 1v. SR26
Contract AF19 604 4556, Proj. 4600, Task 460004
AFCRL 63 583 Unclassified report

Descriptors: (*Dipole antennas, Electrical impedance), (*Electrical impedance, Mathematical analysis), Ground (Electrical), Electric wire, Power, Water, Magnetic fields, Antenna configurations, Antenna radiation patterns, Tables, Programming (Computers), Antenna masts.

The impedance of a vertical monopole located over the surface of an imperfectly conducting earth and having a radial-wire ground system was studied theoretically. This report is a presentation of calculations based on a theory showing the behavior of antenna impedance as a function of antenna height, top-loading and number, size and length of radial wires, as well as ground conductivity and permittivity. (Author)

AD-428 185 Div. 8
OTS price $9.10

HP Associates, Palo Alto, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 5, 1 Sep-30 Nov 63.
30 Nov 63, 97p.
Contract AF33 657 9772
Unclassified report

Descriptors: (*Integrated circuits, Electron optics), (*Semiconductor devices, Electron optics), Capacitance, Electric potential, Electric currents, Gallium alloys, Arsenic alloys, Zinc, Diffusion, Manufacturing methods, Fixed contacts, Diodes (Semiconductors), Epitaxial growth, Low temperature research, Photoelectric cells (Semiconductor), Amplifiers, Semiconducting films, Vapor plating, Electrical properties, Luminescence.

Research was continued on a program to improve and exploit semiconductor optoelectronic phenomena effect for potential use in functional electronic blocks. Detailed studies of the capacitance and of the V-I characteristics and emission bands as a function of temperature were made for zinc-diffused GaAs diodes. The degree of reproducibility of our el diode fabrication procedure was established, and various materials for diffusion substrates were evaluated. The formation of ohmic contacts to the diodes was improved. GaAs el diodes were fabricated by depositing epitaxial n-type material on p-type substrates. The optical and electrical properties at 77K and 300K are reported. Limited work was done on diodes formed by zinc diffusion into n-type epitaxial layers. Si phototransistors for use in optic amplifiers were studied. The present method for assembling the optic amplifier consisting of a GaAs el diode and a Si phototransistor is described. Coupling problems are discussed.

AD-428 198 Div. 8
OTS price $7.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
INVESTIGATION OF LARGE-SIGNAL TRAVELING-WAVE TUBES.
Quarterly progress rept. no. 5,
by G. T. Konrad and J. E. Rowe. Dec 63, 61p.
Contract AF30 602 2834, Projs. 5573, 05228, Task 557303
RADC TDR63 519 Unclassified report

Descriptors: (*Traveling wave tubes, Mathematical analysis), (*Klystrons, Mathematical analysis), Space charges, Coupling circuits, Density, Electrodes, Focusing, Electron beams, Programming (Computers), Magnetrons, Electron guns, Effectiveness, Microwave amplifiers, Gain, Nonlinear differential equations, Phase control devices.

Research was continued on a study of large signal traveling-wave tubes. Extensions on the two-dimensional large-signal analysis for klystrons and traveling-wave tubes are presented. Space-charge effects and the effects of stream subdivisions and the number of charge groups chosen are shown in a number of graphs. The work on the nonlinear theory of multistream microwave devices by a density function method is summarized. An improved method of handling the coupling between positive and negative velocity regions was worked out. Experimental test results on several phase-focused tubes are presented. Efficiency enhancements obtained by this method as well as a simple depressed potential collector are described. The test results obtained on the ring-and-bar tube before it had to be rebuilt are also listed. Several additional minor changes made on the solid beam digital computer program are described. Futhermore the status of the program for solution of magnetron injection guns is discussed. (Author)

AD-428 241 Div. 8
OTS price $11.50

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON A HIGH-POWER MILLIMETER-WAVE GENERATOR.
Rept. for June 61-Aug 63,
by J. W. Sedin, M. Purnell, and K. W. Slocum.
Aug 63, 141p.
Contract AF33 616 8369, Proj. 4156, Task 415603
RTD TDR63 4174 Unclassified report

Descriptors: (*Backward-wave oscillators, Power), (*Millimeter waves, Backward-wave oscillators), Waveguides, Electron guns, Waveguide windows, Manufacturing methods, Helixes, Performance (Engineering), Standing wave ratios, Magnetic fields, Physical properties, Modulators.

The purpose of this program is to demonstrate the feasibility of generating very high power, specifically, 100 kw peak and 1000 watts average at 100 Gc, by means of an O type backward-wave oscillator operating at very high voltage. A disc-loaded waveguide which operates from 90 kv to 200 kv was selected as the circuit for the backward wave oscillator. A 900 to 1 convergence ratio electron gun was developed. This perveance 0.125 x 10 to the -6th power electron gun was focused through a .062 in. diameter beam hole with over 96% transmission at 190 kv. The power density in the beam was 280 megawatts per square cm. Peak power of 107 kilowatts was measured using a calorimeter as a power standard. An average power of 324 watts was measured using the calorimeter. Both of these power levels exceed any other known values of power at a frequency of 100 Gc. (Author)

AD-428 242 Div. 8, 1
OTS price $8.60

Bell Helicopter Co., Fort Worth, Tex.
JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH (JANAIR) ROTOR BLADE RADAR ANTENNA REPORT PHASE I,
by Leonard R. Lindenmeyer and David W. Young.
13 Jan 64, 75p. Rept. no. 299 099 251
Contract Nonr4148 00
Unclassified report

Descriptors: (*Rotor blades (Rotary wings), Slot antennas), (*Slot antennas, Rotor blades (Rotary wings)), (*Radar antennas, Rotor blades (Rotary wings)), Helicopter rotors, Feasibility studies, Digital computers, Antenna radiation patterns, Waveguides, Waveguide couplers, Errors, Distortion, Polarization, K band, Programming (Computers).

A research program to investigate the feasibility of using the main rotor blade of a helicopter as a radar antenna was conducted. Special blade sections were built and tested to study various design ideas. Digital computer studies of slotted arrays were programmed on an IBM 7070 computer at Bell. Both a 43-inch section and a 173-inch section of UH-1B rotor blade were built with a slotted array placed near the trailing edge. These blade antennas were statically tested. Radiation pattern measurements were made of beamwidths, sidelobe levels, and front-to-back ratios. The problem of transmitting energy to a spinning rotor blade was examined and preliminary sketches of the hub layout were made. A 0.28 degree beamwidth was obtained at the Rayleigh Range for the 173-inch blade with the antenna focused at infinity. Sidelobe levels and front-to-back ratio were 20 db. (Author)

AD-428 273 Div. 8
OTS price $5.50

DECO Electronics, Inc., Boulder, Colo.
ELF AND VLF ATMOSPHERIC NOISE,
by E. L. Maxwell and D. L. Stone. 10 Jan 64, 59p.
Rept. no. 30P6
Contract Nonr338700, Proj. NR371 590
Unclassified report

Descriptors: (*Atmospherics, Measurement), (*Radiofrequency interference, Atmospherics), Extremely low frequency, Very low frequency, Instrumentation, Probability, Lightning, Propagation, Electric fields, Magnetic fields.

Various parameters of atmospheric noise have been measured over a wide frequency range (20 c/s to 50 kc/s) at a variety of geographic locations. Complete amplitude probability distributions were obtained as well as the average vertical electric field data, E(avg). Horizontal magnetic field data, H(avg), were also obtained. The amplitude probability distributions, APDs, provided an average to rms conversion factor that enabled E(avg) and H(avg) data to be converted to the more useful E(rms) and H(rms). Typical APDs are shown for Point Barrow, Alaska and Malta. Mean noise density values are given as a function of time block, season, and region and are compared with CCIR predictions. Standard deviations of the five minute averages are presented with probability plots of five minute averages. Finally, geographical variations are shown for data obtained over a wide latitude and longitude range. (Author)

AD-428 360 Div. 8
OTS price $3.60

General Electric Co., Irmo, S. C.
SOLID ELECTROLYTE TANTALUM FOIL CAPACITOR.
Quarterly research and development rept., 1 Oct-27 Dec 63,
by A. L. Jenny. 27 Dec 63, 33p.
Contract NObsr89380, Proj. SR0080303, Task 9636
Unclassified report

Descriptors: (*Tantalum capacitors, Manufacturing methods), (*Manufacturing methods, Production), (*Foils, Tantalum capacitors), Pickling, Electric wire, Welding, Heat treatment, Capacitance, Oxides, Dielectric properties, Dielectrics, Reliability (Electronics), Manganese compounds.

The development of 150 and 250 volt devices capable of full voltage operation at 85 C is described. Design objectives for the electrical and environmental parameters are listed. (Author)

AD-428 378 Div. 8
OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
AN INVESTIGATION OF MICROWAVE BROADBAND TRANSISTOR AMPLIFIERS,
by Samuel T. Uptain and Robert D. Thompson.
30 July 63, 11p.
DA Proj. 1R2 42103D225
AMC RA RE TM63 4 Unclassified report

Descriptors: (*Transistor amplifiers, Microwave frequency), (*Microwave frequency, Broadband), (*Broadband, Transistor amplifiers), Gain, Germanium, Performance (Engineering), Tuned circuits, Sensitivity, Electrical impedance, Admittance.

This report summarizes the procedures and results of a study made of transistor amplifiers for possible use in phased-array radar applications. Various commercially-available types of transistors were investigated, with particular emphasis on their gain-bandwidth product and noise figure. Using the most promising of these as a basis, a method was devised for designing the optimum circuit. This method, employing a Linvill Chart, is described in the report. (Author)

AD-428 379 Div. 8, 6
OTS price $2.60

Sylvania Electric Products, Inc., Mountain View, Calif.
OPTIMIZED COHERENT OPTICAL RECEIVER TECHNIQUES.
Dec 63, 22p.
Contract AF30 602 3162, Proj. 4506, Task 450608
RADC TDR63 490 Unclassified report

Descriptors: (*Image tubes, Microwave frequency), Electron guns, Phototubes, Scanning, Traveling wave tubes, Photoelectric cells (Semiconductor), Photocathodes, Sensitivity, Deflection coils.

Efforts were directed to develop a scannable photosensitive image detector capable of responding to modulation at a microwave rate. The initial tube design has been completed, utilizing an image dissector electron gun, together with an X-band slow-wave structure. The first phase of the program, which was the construction of test diodes to evaluate the cathode surface, has been completed. Work on the second phase, which will be the evaluation of the deflection system using a complete gun tester, but without a slow-wave structure, has begun. One gun tester has been completed, and the deflection system is finished except for the sweep amplifiers. (Author)

AD-428 398 Div. 8
OTS price $2.60

Maryland U., College Park.
PRESSURIZED TRIGATRONS WITH A 10 KV - 50 KV LOW JITTER OPERATING RANGE,
by George Goldenbaum and Eduard Hintz. July 63, 23p. Rept. no. TR314
Unclassified report

Descriptors: (*Electronic switches, Electric discharges), Electric potential, Sparks, Electric fields, Electrical corona, Capacitors, Pressure, Electrodes.

By using enclosed switches at higher pressures and smaller electrode spacing the breakdown characteristics of asymmetric trigatrons, described in detail by Lupton, have been further improved. The mechanical construction remains simple and voltages up to 50 kv can be switched. At electrode distances from 3 mm to 5 mm and pressures between 15 and 75 psi both statistical and formative time lags are below 20 millimicron/sec, even with the operating voltage as low as one third of the static breakdown voltage. The comparatively small breakdown voltage in the triggered case with the observed short delay times is caused by the increasing nonuniformity of the electric field when the trigger potential is raised, and by an intermittent corona between the trigger pin and the main electrode which starts during the charging period. (Author)

AD-428 429 Div. 8
OTS price $1.60

Harry Diamond Labs., Washington, D. C.
SOME UNIQUE DESIGNS OF MICROWAVE FERRITE PHASE SHIFTERS,
by H. Jones and F. Reggia. 30 Dec 63, 21p.
Proj. 26300
HDL TR1189 Unclassified report

Descriptors: (*Phase shifters, X-band), (*Ferrites, Phase shifters), Microwave frequency, Magnetic field, Modulators, Standing wave ratios, Waveguides, Dielectrics, Magnets, Waveguide bends, Solenoids, Phase control devices, Magnetic modulator.

Several unique types of microwave ferrite phase-shifter designs are described. Each type offers certain distinct advantages when used in the laboratory and in microwave systems. The most salient feature of these low-loss devices is the design compactness, consistent with optimum electrical performance. The electrical characteristics of these phase shifters and their components are given. These characteristics show that as much as 500 deg of phase shift can be achieved in x-band with a one-in. spacing between input and output ports. In each case, only a small magnetic field strength is required to obtain the desired phase shift. Other features of these ferrite devices include simplicity in construction, low cost, and small physical size. (Author)

AD-428 445 Div. 8
OTS price $1.60

Litton Industries, San Carlos, Calif.
HIGH PERVEANCE GUN STUDY.
Quarterly progress rept. no. 9, 1 June-31 Aug 63, by R. D. Harris and F. F. Lee. 13 Sep 63, 15p.
Contract DA36 039SC87313, Proj. IG6 22001A055 04
Unclassified report

Descriptors: (*Klystrons, L-band), (*Electron guns, Klystrons), Beams (Electromagnetic), Cavity resonators, Tuning devices, Magnetic fields, Cathodes (Electron tubes).

Efforts continued on the study of stable, well focused, high perveance, large diameter hollow beams. Design objectives for an L-band superpower amplifier klystron, utilizing a high perveance hollow beam, are presented. The tube will be constructed so that rf characteristics of the hollow beam can be examined for beam perveances. The electrical design of a magnetron injection gun is reported. The gun will utilize an inverted geometry (cathode diameter greater than modulating anode) in a tapering magnetic field. The gun will have a convergence in the area of 19. The klystron body is being scaled from an existing L-band tube. The electrical design of the rf structure, including broadbanding techniques to conform to the new design objectives, is presented. (Author)

AD-428 495 Div. 8
OTS price $2.60

SFD Labs., Inc., Union, N. J.
DEVELOPMENT OF A Ku-BAND CROSSED-FIELD AMPLIFIER.
Interim rept. no. 1, 27 June-30 Sep 63, by John McBride and Fred Feulner. Oct 63, 22p.
Rept. no. 32IDR1
Contract NObsr89517, Proj. SR0080301
Unclassified report

Descriptors: (*Electron tubes, Microwave amplifiers), (*Microwave amplifiers, Electron tubes), K band, Gain, X band, Test sets, Waveguide couplers, Tests, Radiofrequency power, Electron tube parts.

The first interim engineering report on a Ku-band crossed-field amplifier development program is presented. Crossed-field amplifier experience at S-F-D laboratories is reviewed and it is shown that the amplifier circuit best suited for this program is a choke supported interdigital line. This circuit has been proved electronically sound at X-band and the Ku-band dispersion curve presented in this report indicates that it is readily scalable to higher frequencies. Impedance matching transformer studies, using brass cold test models, exhibit a very low VSWR. (Author)

AD-428 538 Div. 8
OTS price $2.60

Radio Corp. of America, Harrison, N. J.
PRODUCTION ENGINEERING MEASURE FOR TUBE TYPE 7587.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 63, by W. Ackermann. 30 Nov 63, 17p.
Contract DA36 039sc86732
Unclassified report

Descriptors: (*Electron tubes, Production), Subminiature electron tubes, Vacuum apparatus, Manufacturing methods, Automation, Lathes.

Effects continued to provide critical facilities for the high volume, low cast, production of nuvistor tube types, with special emphasis on tube type 7587, by the development and construction of an automatic grid lathe, exhaust machine, and lead loader. The truss grid and exhaust machines have achieved production levels of output and are in regular, scheduled factory use. The lead loader and copper washer machines were debugged, tested, and are ready for production use. The preproduction samples were fabricated in accordance with the contract provisions, and arrangements were made to test the tubes with Signal Corps personnel in attendance. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-428 551 Div. 8, 20
OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright Patterson Air Force Base, Ohio.
THE EFFECT OF GAMMA RAYS ON GERMANIUM DIODES,
by Ye. M. Lobanov, V. I. Zvyagin, D. I. Blinkov and G. B. Blinkova. 8 Oct 63, 7p.
FTD MT63 88 Unclassified report

Trans. from Nekotoriye Voprosy Prikladnoy Fiziki pp. 55-57, 1961.

Descriptors: (*Diodes (Semiconductor), Radiation damage), (*Radiation damage, Diodes (Semiconductor)), (*Gamma rays, Radiation damage), Electric current, Photoelectric cells (Semiconductor), Germanium, Intensity, Light.

AD-428 553 Div. 8
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROACOUSTICAL TEMPERATURE-FREQUENCY CONVERTER,
by V. V. Kovalevskaya andV. K. Potapkin.
8 Oct 63, 9p.
FTD MT63 99 Unclassified report

Trans. from Priborostroyeniye No. 2, pp. 11-13, 1963.

Descriptors: (*Electroacoustic transducers, Design), Temperature, Resonance, Resonators, Avalanche diodes, Amplifiers.

A discussion is presented of an electroacoustical temperature-frequency converter.

AD-428 576 Div. 8, 25
OTS price $1.10

Compagnie Generale de Telegraphie, Sans Fil (France).
GENERATION OF INFRAMILLIMETRIC WAVES BY MEANS OF ELECTRONIC BEAMS,
by Yeou Ta. 31 Oct 63, 4p. Rept. no. W R1112, TN1
Contract AF61 052 715
RADC TDR64 29 Unclassified report

Descriptors: (*Electron beams, Detectors), (*Millimeter waves, High frequency), Design, Electron guns, Interferometers, Measurement, Silicon.

High frequency waves over the range of 541-612 Gc/s have been obtained by a recent C. S. F. mm carcinotron at the milliwatt level (Author)

AD-428 578 Div. 8
OTS price $8.60

Sylvania Electric Products, Inc., Waltham, Mass.
MULTIPLE BEAM INTERVAL SCANNER,
by Francis J. LaRussa. 11 Sep 63, 83p. SR SR485 1
Contract AF19 604 7385, Proj. 4600, Task 460007
AFCRL 63 535 Unclassified report

Descriptors: (*Lens antennas, Scanning), (*Scanning, Lens antennas), Electromagnetic lenses, Probes (Electromagnetic), C band, Antenna radiation patterns, Beams (Electromagnetic), Feasibility studies, Antenna feeds.

An experimental program to demonstrate the feasibility of combining a coaxial probe monopulse organ pipe scanner with a wide angle two-dimensional constrained lens is described. The antenna system which was built and tested to prove this feasibility operates in the 5250 mcs to 5750 mcs range. It produces a half power beamwidth of 2 degrees in azimuth by 4 degrees in elevation which can be scanned ±36 degrees from broadside in the azimuth plane. Variations of the measured radiation characteristics with frequency and angle of scan are summarized in graphical form. Design data and typical monopulse sum and difference patterns are presented. The test results show that such a lens-scanner antenna system is practicable for wide angle scanning in one plane. (Author).

AD-428 601 Div. 8
OTS price $10.50

Bendix Corp., Southfield, Mich.
INVESTIGATION OF TECHNIQUES FOR SPACE-ORIENTED TUBES,
by John G. Meeker. Jan 64, 1v.
Contract AF30 602 2984, Proj. 5573, Task 557303
RADC TDR64 7 Unclassified report

Descriptors: (*Microwave amplifiers, Space-borne), Power amplifiers, Space environmental conditions, Electron tubes, Space probes, Radiofrequency power, Design, Electron tube parts, Environmental tests, Space communication systems.

Efforts were directed to establish criteria for the design of high power microwave amplifiers and for the selection of their constituent materials that will adequately allow the tubes to perform their functions in the environments conditions associated with space missions. This interim report covers the first eight months of a year's effort. During this period the effort was weighed in favor of the environment and materials to withstand the environment. Most of the ceramics and metal materials currently used in the construction of microwave amplifiers are suitable for space operation. Pre-flight testing as well as basic design considerations are also included in this report. (Author)

AD-428 609 Div. 8, 26
OTS price $3.60

Vacuum Tube Products Div., Hughes Aircraft Co., Oceanside, Calif.
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
Interim development rept. 24 June-1 Oct 63,
by P. P. Damon. 5 Nov 63, 36p.
Contract NObsr89452, Proj. SR00 80301, Task 9459
Unclassified report

Descriptors: (*Storage tubes, Colors), (*Manufacturing methods, Storage tubes), Electron guns, Electrostatic fields, Collimators, Cathode ray tube screens, Electric potential, Intensity, Luminescence, Frequency shift.

A direct view storage tube is being developed which is capable of displaying stored information in either of two colors or in intermediate hues, and selectively erasing that information. The operating principle is based on the fact that flood electrons which pass through holes in the storage mask when the storage-surface potential is near cutoff, fall within small areas on the viewing screen opposite the storage mask holes; whereas flood electrons which pass through the holes when the potential is near its maximum, (i.e., flood gun cathode potential), fall on larger overlapping areas of the viewing screen. The viewing screen consists of two phosphors. One occupies small areas in register with the storage-mask holes, while the other occupies areas surrounding the first. This tube is 10 inches in diameter and is apparently an extension of the

work performed under a previous program. Included in this report are data on flood gun electron trajectories and spot spread and target control characteristics measured on a monochromatic version of the proposed tube. Approximate brightness and color-shift characteristics for a given phosphor dot pattern were calculated from these data. Comparisons are made between the performance expected from this two-color tube and the tube developed under the earlier program. (Author)

AD-428 609 14 N8

&&&Design and fabrication of two-color selective erase storage tubes.

911 800

AD-428 628 Div. 8
OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CIRCUITS WITH DIRECT COUPLING (Skhemy S Neposredstvennymi Svyazyami),
by L. V. Kutukow and D. I. Obidin. 27 Sep 63, 33p.
FTD TT62 1869 Unclassified report

Trans. from Elektronnyye Vychislitel'nyye Mashiny, pp. 1-39, 1962.

Descriptors: (*Transistors, Circuits), (*Circuits, Transistors), Coupling circuits, Computers, Resistors, Capacitors, Computer logic, Switching circuits, Theory, Stability, Trigger circuits.

All transistor computer circuit applications can be divided into two groups: saturated circuits and circuits with limited saturation. In many cases, the first type is more promising and requires fewer components; the second type operates faster. With regard to direct coupled circuits operated under saturated conditions, all of the requirements of transistors operating in saturation circuits with R and RC coupling circuits, are applicable to the former circuits also. In addition, new requirements inherent only to this type of circuit are in effect. In this text all these requirements are considered briefly, and the results of the measurements of some parameters of locally produced transistors P 403 + P 413 and the testing of these transistors in the simplest logical circuits are presented. (Author)

AD-428 640 Div. 8
OTS price $4.60

Boeing Co., Seattle, Wash.
WINGS III-V MONTHLY SUMMARY REPORT NUMBER 4.
22 Jan 64, 39p. Document no. D2 15472 9
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Research program administration), Tests, Performance (Engineering), Ground support equipment, Military facilities, Human engineering, Guided missile safety, Guided missile personnel, Launching, Guided missile components, Checkout equipment, Scheduling, Launching sites, Ground support equipment, Malfunctions, Air force.

This report is the test summary for the period 1-31 December 1963. It defines major test requirements, their degree of attainment, major program problems encountered and recommendations which may improve or accelerate the test program. It is not the purpose of this document to describe in detail each test performed, but rather, to report in general terms, the major test operations scheduled during the period, and to describe briefly the manner in which the program has progressed. (Author)

AD-428 643 Div. 8
OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
UHF DUPLEXERS.
Quarterly progress rept. no. 4, 5 Aug-5 Nov 63, by Henry Griffin and Sumner Segal. 5 Nov 63, 14p.
Contract Nobsr89105, Proj. SF0010205, Task 6158
Unclassified report

Descriptors: (*Switching circuits, Ultrahigh frequency), (*Diodes (Semiconductor), Limiters) (*Ultrahigh frequency, Switching circuits), Power, Life expectancy, Ferrites, Circuits, Electrical impedance, Standing wave ratios, Resistance (Electrical), Capacitance, Electric potential.

A three port ferrite circulator was developed that is capable of handling 500 kw peak power, 3500 watts average power over the band 400 to 450 mc. Preliminary results have been obtained on a 200 to 225 mc circulator. A solid state diode limiter has been designed and tested for the 400 to 450 mc band. This limiter, mounted behind a ferrite circulator, is capable of protecting the receiver when 300 kw peak power and 3 kw of average power from the transmitter is subjected to a 2 to 1 antenna mismatch. For the 200 to 225 mc band a complete solid state diode limiter has been achieved that can successfully switch 200 kw peak power, 2 kw average power with a 60 microsec pulse width. (Author)

AD-428 675 Div. 8, 2
OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OCCULTATION OF THE CRAB NEBULA BY THE SOLAR CORONA IN JUNE 1963,
by J. D. Wyndham and B. G. Clark. June 63, 4p.
Contract Nonr22019
Unclassified report

Descriptors: (*Nebulae, Solar corona), Scattering, Electrons, Radio interferometers.

Observations of the Crab Nebula were undertaken in June 1963 using the twin 90-ft dishes of the California Institute of Technology's Owens Valley Radio Observatory. The two antennae were employed as an east-west interferometer of spacing 680 wavelength operating at a frequency of 1660 Mc/s (18 cm wavelength). Any increase in angular diameter of the source, observed with interferometer, results in a decrease in the recorded source response which may be interpreted directly in terms of the angular extent of the scattered distribution. The quiet sun was largely resolved and gave a contribution to the total response which was only a fraction of the response due to the source itself. In the absence of an appreciable solar contribution it was possible to detect scattering angles as small as 0.7. In order to allow for the solar contribution, additional observations of the response were made each day with the antennae directed towards the positions which the source took relative to the sun on each of the occulting days. As the angular separation of source and sun decreased, the gain was decreased by measured amounts (always less than 0.4 db) to preserve the same detector levels in the presence of solar noise. The response of the

source 3C 123 was observed each day and used to correct for small changes in receiver sensitivity. When the above factors were taken into account in the anaylsis, no positive evidence for a variation in the source response, corresponding to an increase in angular diameter, was found. (Author)
AD-428 675 2 N8
&&&Occultation of Crab Nebula by solar corona.

737 550

AD-428 676 Div. 8, 25
OTS price $1.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
ON THE MEASUREMENT OF POLARIZATION DISTRIBUTIONS OVER RADIO SOURCES,
by D. Morris, V. Radhakrishnan and G. A. Seielstad. 1963, 13p.
Contract Nonr22019
Unclassified report

Descriptors: (*Radio waves, Distribution), (*Polarization, Measurement), Antennas, Interferometers, Numerical analysis, Antenna feeds.

A method for the determination of polarization distributions over radio sources by means of interferometric techniques is described. An expression is given for the response of an interferometer with arbitrarily polarized antennas, and some special cases of interest are discussed. (Author)

AD-428 677 Div. 8, 25, 2
OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Pasadena.
LINEAR POLARIZATION MEASUREMENTS OF THE DECIMETER WAVELENGTH RADIATION FROM SMALL DIAMETER RADIO SOURCES,
by G. A. Seielstad, D. Morris, V. Radhakrishnan and R. W. Wilson. 1963, 8p.
Contract Nonr22019
Unclassified report

Descriptors: (*Radio waves, Measurement), (*Antenna masts, Horn antennas), Polarization, Radio astronomy, Interferometers, Brightness, Stars, Instrumentation, Integrators, Galaxies

AD-428 717 Div. 8
OTS price $2.60

Harry Diamond Labs., Washington, D. C.
20-VOLT AVALANCHE DIODES AS NOISE GENERATORS,
by K. O. Otley. 5 Nov 63, 26p.
Projs. 1P523801A300, HDL96300
HDL TR1184 Unclassified report

Descriptors: (*Avalanche diodes, Noise generators), (*Noise generators, Avalanche diodes), Measurement, Silicon, Electric potential, Temperature, Noise analyzers, Noise, Test equipment (Electronics).

Measurements of noise output and observations of noise spectrum were made on 20-v silicon avalanche diodes (often called Zener diodes) over the range of noise-producing voltage at -40, 75, and 160 F. Six types from five manufacturers were selected for this test. Each diode type evaluated was obtained from a single manufacturer. Among those tested, type 1N1317A is believed most suitable for use as a noise generator, but planar diodes are preferred in all circuits in which a sufficiently high supply voltage is available. (Author)

AD-428 719 Div. 8, 6
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
VIBRATION OF RADAR MASTS MEASURED ON USS LONG BEACH (CGN 9) AND USS OKINAWA (LPH 3),
by John T. Cummings. Dec 63, 19p.
Proj. SF013 11 08
DTMB 1789 Unclassified report

Descriptors: (*Antenna masts, Vibration), (*Radar antennas, Shipborne), Cruisers, Nuclear powered vessels, Aircraft carriers, Amphibious operations, Propeller blades, Propellers (Marine)

Maximum amplitudes and accelerations measured on the radar masts of USS LONG BEACH (CG(N)9) and USS OKINAWA (LPH 3) are presented. Amplitudes and accelerations due both to propeller-blade and shaft frequencies and to maneuvers are included. (Author)

AD-428 734 Div. 8
OTS price $2.60

Bomac Labs., Inc., Beverly, Mass.
NOISE SOURCE FOR MILLIMETER WAVELENGTH.
Quarterly progress rept. no. 1, 1 July-1 Oct 63,
by Arnold M. Eklund. 1 Oct 63, 20p.
Contract DA36 039AMC03229E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Noise generators Millimeter waves), (*Discharge tubes, Noise generators), Argon, Standards, Quartz, Crystal detectors, Klystrons, Oscillators.

The major portion of this period was spent in background study in preparation for initial design considerations of the standard hot load source and the gas tube noise source, and in selection and purchase of 3 mm. test components. Approximately 50% of the test components were received including a klystron. The klystron will be mounted in oil to increase stability in terms of frequency and power output. A muffle furnace was purchased in which the black body radiator, a silicon carbide load, will be heated to 1000C. Initial design considerations of the gas noise tube consists of a quartz tube of 0.033 cm. inner radius using Argon at a pressure of 14 mm. of Hg. (Author)

AD-428 779 Div. 8
OTS price $5.60

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF THE SLOT TRANSMISSION LINE AND SLOT ANTENNAS. PART 5. RADIATION FIELDS OF SLOT-YAGI ANTENNAS ON FINITE PLANAR AND CURVED SURFACES,
by Robert W. Burton. 8 Nov 63, 1v. Technical rept. no. 427
Contract Nonr1866 32, Proj. NR371 016
Unclassified report

Descriptors: (*Slot antennas, Antenna radiation patterns), (*Antenna radiation patterns, Slot antennas), Dielectrics, Dipole antennas, Cylindrical bodies, Antenna configurations, Propagation, Standing wave ratios, Antenna feeds, Supersonic planes, Communication equipment.

The results from observations of the far field of planar and curved slot arrays, very similar to those upon which precise current and field distribution measurements were made are discussed. Of particular interest is the circular slot array formed by folding the slot Yagi antenna back upon itself. This array is discussed in some detail and some applications to communications systems of missiles and rockets are pointed out. (Author)

AD-428 780 Div. 8
OTS price $13.00

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF CIRCULAR ARRAYS -3- RADIATION PATTERNS AND CURRENT DISTRIBUTIONS,
by Richard B. Mack. 1 May 63, 1v. Rept. no. TR383
Contract Nonr1866 32 Proj. NR371 016
Unclassified report

Descriptors: (*Coupled antennas, Antenna radiation patterns), (*Antenna radiation patterns, Coupled antennas), Mathematical prediction, Electric fields, Admittance, Equations, Antenna configurations, Dipole antennas, Integral equations, Electric currents.

Measured radiation patterns and current distributions are compared with the results computed from quasi-zeroth-order theory for a single antenna and arrays of up to five antennas. Circular arrays with one driven element are shown to radiate very little power in the backward direction if the elements are located near the resonant spacings. Agreement between theory and experiment is somewhat poorer near these spacings. The endfire couplet consisting of two antennas separated by quarter wavelength with driving-point currents 90 degrees different in phase is shown to give the cardioidal pattern predicted by zeroth-order (sinusoidal) theory only when wavelength is not much greater than 0.2500. This pattern can be produced with other antenna lengths, but the required current ratios are very different from those given by zeroth-order theory. Experimental results are correctly predicted by quasi-zeroth-order theory. When two antennas are fed with equal amplitudes but a 180 degree difference in phase, the power gain of the array is shown to increase and the beamwidths to decrease as the separation between the antennas is decreased. (Author)

AD-428 787 Div. 8
OTS price $4.60

Microwave Associates, Inc., Boston, Mass.
LONG LIFE K-BAND DUPLEXER.
Quarterly technical rept. no. 5, 1 July-1 Oct 63,
by P. Basken and R. Brunton. 1 Oct 63, 1v.
Contract DA36 039sc90834, Proj. ARDS A142,
Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Radar duplexers, K band), (*Transmit-receive tubes, Radar duplexers), (*Limiters, Radar duplexers), (*Varactor diodes, Limiters), Tests, Life expectancy, Radiofrequency power, Mounting brackets, Attenuation, Performance (Engineering), Microwave equipment.

Research was continued on the development of a long life K-band three port duplexer. The gaseous TR tube development was directed toward design refinements on new tubes based on the test performance secured to date. New designs were evolved and tests on everall performance and life test data are presented. The microwave circuitry for limiter design was conceived and several circuits were evaluated using the PIN diodes. The PIN diode was shown to be unsatisfactory because of its slow response time. However, these diodes did provide information useful in circuit design. Finally, data is also presented on tests where the gas TR tube and a semiconductor limiter combination were subjected to high power. Leakage power and crystal protection were subjected to high power. Leakage power and crystal protection data taken in tests on this configuration are presented. (Author)

AD-428 794 Div. 8
OTS price $5.60

Advisory Group on Electron Devices, New York.
ON PROJECTS DEALING WITH ADVANCED ELECTRON DEVICE TECHNOLOGY,
Oct 63, 53p. Status rept. no. 77
Contract DA36 039sc89076
Unclassified report

Descriptors: (*Electronics, Scientific research), (*Scientific research, Electronics), Electron tubes, Abstracts, Microwave equipment, Radar duplexers, Phase shifters, Semiconductor devices, Magnetrons, Millimeter waves, Waveguides, Thyratrons, Integrated circuit, Tetrodes, Electric filters, Resistors, Capacitors, Electron guns, Transmission lines, Limiters, Cathodes (Electron tubes), Noise (Radio), Semiconducting films, Camera tubes, Films.

Results achieved on projects sponsored by the Military Departments and other government agencies in the advanced electron device technology area are summarized. Items of collateral interest and extracts from non-government reports and publications are also included. While intended to be reasonably comprehensive, the reports should not be considered complete accounts of all work in the area. For the sake of brevity, each item which deals with a continuing project is normally written in serial fashion from report to report; where warranted, a summary review is occasionally included. Individual items appearing in any one issue will reappear in future issues when additional information of a significant nature is available. (Author)

AD-428 822 Div. 8
OTS price $1.60

General Atronics Corp., Philadelphia, Pa.
DESIGN, DEVELOP AND FABRICATE MINIATURE, FIBER OPTIC FACEPLATE CATHODE RAY TUBES.
Quarterly progress rept. no. 2, Aug-Oct 63,
by Robert C. Hilliard, Guy Barnett, Robert S. Moore and Sam Pearlman. Oct 63, 7p.
Contract NObsr89280, Proj. SR008035, Task 9477
Unclassified report

Descriptors: (*Cathode ray tube screens, Fiber optics), (*Fiber optics, Cathode ray tube screens), (*Cathode ray tubes, Miniature electron tubes), Vacuum apparatus, Electron guns, Electron optics, Electron accelerators, Phosphorescent materials, Deflection, Sensitivity, Distortion, Resolution.

Efforts were continued on the development of miniature fiber optic faceplate cathode ray tubes. The bell jar vacuum system demountable setup was completed and one assembly using a stock gun was made to check the electron optics of the ballistic and post acceleration region. A second assembly was made using a stock gun and a graded pitch spiraled post accelerator. A third assembly was made using a gun designed with regard to its electron optical performance. The ballistic and post accelerator of the second setup were used. Two sealed off gun test tubes and three sealed off phosphor test tubes were also made. The conclusions were as follows: (1) a uniform field in the ballistic region was desirable; (2) a graded pitch spiral in the post acceleration region gave divergence which improved the deflection sensitivity as full scan; (3) some pattern distortion resulted from lack of field matching between the ballistic and post acceleration region; (4) the overall system with the gun designed for this tube should be capable of giving an undeflected spot size of 0.0018 inches; and (5) P28 phosphor was not a good candidate for high resolution work. (Author)

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AD-428 897 Div. 8
OTS price $6.60

Hughes Aircraft Co., Fullerton, Calif.
PHASED ARRAY STUDY.
Interim development rept., 1 Oct 63-1 June 64.
31 Jan 64, 1v. Rept. no. FR64 14 17
Contract NObsr89427, Proj. SR0080302, Task 9637
Unclassified report

Descriptors: (*Antennas, Phase shifters), (*Diodes (Semiconductors). Phase shifters). (*Phase shifters, Antennas). S band, Switching circuits, Digital systems, Antenna configurations, Antenna radiation patterns.

Research concerns an investigation of the performance of digital phase shifters using semiconductor diode switches in phased array antennas. A 10 element array will be designed and tested at S-Band. The 180-degree phase bit was designed and tested. A new circuit technique, called the transformed switch circuit, was investigated theoretically and found to be superior to the conventional method of switching line sections. The transformed switch circuit was used in the design of the shorter phase bits. Active element patterns of the 10-element array were taken for various ground plane spacings. (Author)

AD-428 907 Div. 8
OTS price $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
RESEARCH ON STORAGE TARGETS FOR CAMERA TUBES.
Final rept., July 62-Sep 63,
by A. H. Boerio. Jan 63, 26p.
Contract AF33 657 8676, Proj. 4156, Task 415605
RTD TDR63 4276 Unclassified report

Report on Electron Device Technology.

Descriptors: (*Cathode ray tube screens, Secondary emission), Electrical conductance, Manufacturing methods, Distortion, Camera tubes, Processing, Aluminum compounds, Oxides, Potassium compounds, Chlorides.

An applied research program is described on Secondary Electron Conduction (SEC) targets. The techniques used in fabricating the SEC layer, including its supporting member, are described in detail. The problems encountered in manufacturing and handling are reported and the necessary precautions outlined. Some of the more frequently occurring defects, like target blemishes and crazing, were investigated. As a result, a satisfactory control over target quality was achieved including the processing of complete tubes. (Author)

AD-428 914 Div. 8, 25
OTS price $4.60

Cornell U., Ithaca, N. Y.
MEASUREMENT OF SOLAR RADIO RADIATION AT 430 MEGACYCLES.
Quarterly status rept., 1 Oct-31 Dec 63,
15 Jan 64, 21p. Rept. no. CRSR 161
Contract Nonr40127
Unclassified report

Descriptors: (*Solar radiation, Ultrahigh frequency), (*Measuring devices (Electrical & Electronic), Solar radiation), Oscillators, Mixers (Electronic), Antenna feeds, Coaxial cables, Radiofrequency amplifiers, Standing waves ratios, Antenna configurations, Gain, Parabolic antennas, Antenna lobes, Polarization

AD-428 954 Div. 8, 2
OTS price $3.60

Stanford Electronics Labs., Stanford U., Calif.
ON THE DETERMINATION OF TEMPERATURE AND IONIC COMPOSITION BY ELECTRON BACKSCATTERING FROM THE IONOSPHERE AND MAGNETOSPHERE,
by D. R. Moorcroft. Oct 63, 32p. Rept. no. 63 125; SR1 7
Contract AF19 604 7436; Grant NSG377, Proj. 5629 Task 562901
AFCRL 63 798 Unclassified report

Descriptors: (*Ions, Temperature), Electron density, Ionosphere, Scattering, Oxygen, Helium, Hydrogen.

Observations of the scattering of electromagnetic waves from thermal fluctuations in the electron density of the ionosphere and magnetosphere have previously been used to investigate ion and electron temperatures and the electron density. This work was based on the assumptions that the only ions present were O(+), and that kD = 4piD/lambda sub T is much less than 1 (lambda sub T is the transmitted wavelength and D is the Debye length) These conditions usually apply at F-region heights. The interpretation of such scattering is extended to conditions likely to apply above the F region, where increasing percentages of He(+) and H(+) are expected to occur, and where kD may not be very small. Detailed curves are presented for mixtures of O(+) and He(+). It appears that, with a sufficiently powerful radar operating at a sufficiently low frequency, scatter observations alone can usually be used to determine the relative concentrations of O(+) and He(+) (and/or H(+)), as well as the electron and ion temperatures and the electron density. When information on one or more of these ionospheric properties is available from another source, simpler scatter observations can be used to complete the set. A simple transformation is given which accurately corrects the interpretation for values of kD up to unity. (Author)

AD-428 975 Div. 8, 20, 25
OTS price $5.60

RCA Labs., Div. Radio Corp. of America, Princeton, N. J.
FUNDAMENTAL STUDIES OF THE CESIUM ARC-MODE THERMIONIC CONVERTER.
Annual technical summary rept. 1 May 62-31 May 63,
by Fred M. Johnson. 31 May 63, 84p.
Contract Nonr382600FBM
Unclassified report

Descriptors: (*Thermionic converters, High pressure research), (*Plasma physics, Thermionic converters), Cesium, Energy conversion, Electron density, Gas ionization, Line spectrum, Mass spectroscopy, Mass spectrum, Emissivity, Molecular spectroscopy, Gas analysis, Impurities.

An experimental study using optical and electrical techniques relating to the fundamental processes associated with the high-pressure, low-voltage cesium arc thermionic converter. Seven different optical methods were employed. Impurities present in the cesium vapor were analyzed by means of a mass spectrometer and the effects of gas additives were investigated. Hydrogen gas is the most damaging impurity since it causes an increase in the electron temperature and participates in hydrocarbon synthesis. A theory of the arc-mode operation was developed based on the optical results. The predicted I-V curve is in good agreement with the experimental results. The measured electron temperatures

were in the 1750 - 2200 K range. A discussion of the ionization mechanism is given. Ionization by cumulative processes involving excited molecular cesium molecules is favored from an energy standpoint. (Author)

AD-428 981 Div. 8, 26
OTS price $2.60

Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE PRODUCTION OF SILICON MONOXIDE CAPACITORS MICROELEMENT.
Quarterly rept. no. 2, 29 Aug-30 Nov 63,
by J. J. O'Connor. 30 Nov 63, 14p.
Contract DA36 039AMC01478E
Unclassified report

Descriptors: (*Capacitors, Silicon compounds), (*Silicon compounds, Capacitors), (*Miniature electronic equipment, Capacitors), (*Manufacturing methods, Capacitors), Oxides, Electric terminals, Modules (Electronic), Production, Jigs, Aluminum, Electrodes.

Further details of the lead configuration have been resolved with respect to the required testing in simulated modules. A problem, however, still exists for the case of the twelve capacitors per module. Microelement holders have been designed for fabrication when the new microcircuit jig is delivered. Capacitors fabricated with the old jig become 'open' upon fault-clearing. The 'open' occurred in the top electrode lead where it crossed the bottom electrode and the dielectric; consequently, the 'open' is thought to be due to an abrupt edge. (Author)

AD-429 050 Div. 8, 6
OTS price $2.60

Gordon McKay Lab. of Applied Science, Harvard U., Cambridge, Mass.
A WIRELESS PROBE FOR MEASURING AN ELECTROMAGNETIC FIELD,
by Keigo Iizuka. 15 Apr 63, 12p. SR5
Contract AF19 604 7262, Grant NSF G20225
Proj. 7661, Task 76615
AFCRL 63 889 Unclassified report

Descriptors: (*Probes (Electromagnetic), Electromagnetic fields), (*Electromagnetic fields, Intensity), (*Transmitter receivers, Probes (Electromagnetic)), Tunnel diodes, Oscillators, Frequency modulation, Dipole antennas, Antenna radiation patterns, Scattering, Miniature electronic equipment, Air, Underwater, Telemeter systems.

A miniature f-m transceiver consisting of 7 Mc/s Esaki diode oscillator has been built for the purpose of telemetering the field intensity of 114 Mc/s electromagnetic wave. This wireless probe is designed to be used under water as well as in free space. Descriptions include the procedure of the design of the transceiver circuit, the layout of the components and the measured results using the wireless probe. (Author)

AD-429 044 Div. 8, 26
OTS price $8.10

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.
Quarterly progress rept. no. 5, 30 Apr-31 July 63, by Richard D. Silverman. 31 July 63, 44p.
Contract DA36 039sc86724
Unclassified report

Descriptors: (*Transistors, Germanium), (*Production, Transistors), Cleaning, Humidity, Encapsulation, Failure (Mechanics), Life expectancy, Desiccants, Etched crystals, Alloys.

Further work on the cleaning procedure involving etching variants and changes in the drying technique is discussed. Three methods of reducing the internal relative humidity of the transistor package are outlined. Evaluation of the redesigned internal clip is discussed, as well as evidence of failure mechanism failure modes and corrective action to be taken. Redesign of the collector pellet resulting in a solution to the high collector current leakage problem is described. Test results of units assembled with component piece parts stored in various ways prior to assembly, and the newly installed production method of material handling of transistor sub-assemblies through the fusing and first electrical testing operations are described. The effectiveness of the improved vendor and internal production process control techniques is discussed. A display of process average information relating to weld and terminal leak control is provided for evaluation. Correlation of failure rates at various temperature stress levels is discussed. (Author)

AD-429 043 Div. 8
OTS price $2.60

General Electric Co., Owensboro, Ky.
Z-5267 CERAMIC TETRODE, 40 WATTS AT 3000 MC. PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 63,
by H. D. Miller. 30 Nov 63, 25p.
Contract DA36 039sc86735
Unclassified report

Descriptors: (*Tetrodes, Production), Radio-frequency power, Ceramic materials, Mechanical drawings, Electron tube heaters, Electron tube parts, Failure (Mechanics), Shock (Mechanics), Vibration, Life expectancy, S band, Ultra high frequency.

Production engineering measure is presented on a 40 watt, 3000 mc tetrode. During the sixth quarter, 116 tubes were constructed. A complete summary of the results obtained and the corrective measures taken is given in detail. The areas of redesign are listed and described in detail. Major accomplishments for the quarter are listed and discussed. All preparation for the Preproduction test witnessing is complete. A plan for the next quarter is given which it is anticipated will conclude the program except for the planned 20 tube extended life study. The product performance adequately meets specification requirement; the tube is very stable with the appearance of life expectancy substantially beyond 1,000 hours. (Author)

AD-429 051 Div. 8, 30
OTS price $8.10

Stanford Electronics Labs., Stanford U., Calif.
THE INFLUENCE OF COMPONENT IMPERFECTIONS ON TRAINABLE SYSTEM PERFORMANCE.
Interim technical rept., Aug 61-June 63,
by P. R. Low. Oct 63, 76p. Technical rept. 4654 1; 63 078
Contract AF33 616 7726, Project 4159, Task 415904
RTD TDR63 4183 Unclassified report

Report on Molecular Electronics.

Descriptors: (*Cybernetics, Computer Storage devices), (*Computer storage devices, Pattern recognition), Artifical intelligence, Adaptive control systems, Training, Magnetic cores, Learning, Gain.

Numerous investigators have considered the behavior of trainable threshold-logic systems using somewhat idealized training procedures. Actual systems built with present-day components seldom implement the ideal training rules. This report considers the effect of such component defects as nonlinearity, nonuniformity, and hysteresis on the performance of trainable systems. The four areas of system performance considered are: the ability of the system to solve a given problem, the stability of the resulting solution, the generalizing ability of the system, and the time required to find a solution. A convergence proof is presented which shows that even a defective system will converge to a solution if one exists. An analytical technique called the 'rate vector analysis' is developed which can be used to predict with reasonable accuracy the time required for a defective system to converge. When used on a 16-input system in which the weights have nonlinear adaption characteristics, the increase in training time due to the defect was predicted within 15 percent. (Author)

AD-429 052 Div. 8
OTS price $6.60

Radiation Inc., Melbourne, Fla.
STUDY OF SPECIAL BEAMSHAPING ANTENNAS.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by R. E. Moseley, B. L. Lewis, L. Pietsch, H. E. Bartlett and G. W. Collins. 31 Dec 63, 1v.
Contract DA36 039AMC03310E, Proj. 1R3 32 101D253
Unclassified report

Descriptors: (*Antennas, Dielectrics), (*Antenna configurations, Design), Expanded plastics, Dielectric properties, Antenna lobes, Antenna feeds, Feasibility studies, Antenna radiation patterns, Wave guides, Gain, Equations, Diffraction, Inflatable structures.

Efforts were directed to investigation of the applicability of end-fire dielectric elements in easily transportable satellite communications antenna arrays and in primary feed systems. Ray-Tracing Theory which was originally employed to predict the effects of element shape on radiation characteristics has provided several bonus discoveries. It has resulted in a simple new concept which explains the optimum length criterion for end-fire antennas. The requisite characteristics for optimum exciters for dielectric wave-guides have also been derived from this theory. This theory has led to the conception of a new and novel type of antenna, the Three-Dimensional Zone Plate. A Foamrod Antenna which provides the highest gain and lowest sidelobes ever achieved with a single end-fire element is described in the report. The resulting gain and maximum sidelobe level are 35 db and -23 db respectively. The feasibility of producing a high-gain Dielectric Tube Antenna has also been demonstrated. Based on primary feed amplitude and phase measurements, it appears that these elements will make highly efficient primary feeds. (Author)

AD-429 053 Div. 8, 26
OTS price $3.60

SFD Labs., Inc., Union N. J.
PRODUCTION ENGINEERING MEASURE FOR A Ka-BAND INVERTED COAXIAL MAGNETRON.
Quarterly progress rept. no. 2, 7 Aug-6 Nov 63, by P. du Fosse and M. Liscio. Nov 63, 28p.
Contract DA36 039AMC01472E
Unclassified report

Descriptors: (*Magnetrons, Manufacturing methods), (*Manufacturing methods, Production), Modulators, Measuring devices (Electrical & Electronic), Aging (Materials), Life expectancy, Spectrum analyzers, Performance (Engineering), Environmental tests, K-band.

Five model tubes were built and evaluated. Four tubes were of the first mechanical design, one of which was designed primarily as a mechanical sample. The fifth tube was a refined version of the initial mechanical design and will be used for at least five more model tubes. Electrical evaluation data of the five tubes are presented. The anode evaluation program to upgrade the Qu's over the required frequency is discussed. Also discussed is some specialized test equipment and the initial environment tests performed. (Author)

AD-429 069 Div. 8
OTS price $8.60

Gulton Industries, Inc., Albuquerque, N. Mex.
INSTRUCTION MANUAL FOR SLED-BORNE TIMER.
1963, 1v.
Contract AF29 600 4171
Unclassified report

Descriptors: (*Timing devices, Rocket propelled sleds), Instruction manuals, Computer logic, Transistors, Gates (Circuits), Switching circuits, Diodes (Semiconductor), Printed circuits, Time interval counters, Computer storage devices.

A portable time code generator which approaches laboratory stability in a rugged unit designed for sled-borne operation is described. In operation the Model CGT-150 timer is mounted on the sled and connected to a block house control unit via hard wire. A manual switch on the block house control unit permits the operator to disconnect the sync signals prior to sled pull-away to check for drift in the sled-borne timer. The drift may be monitored on a visual display mounted in the block house control unit which indicates the phase difference in micro-seconds between the master and the sled timers. This permits a convenient last minute check of the system prior to sled firing. As an additional check on the system, a pulse by pulse comparison is made between the master and sled timers. If the sled-borne timer drifts out of sync with the master, a red light and buzzer sounds the alarm. A voltmeter on the front of the block house control unit monitors the battery voltage supply for the sled-borne timer. (Author)

AD-429 117 Div. 8
OTS price $6.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
REALIZATION OF TRANSFER FUNCTIONS OF RC: TUNNEL-DIODE NETWORKS,
by David L. Losee. Oct 63, 56p. RR EE574, 78
Contract AF33 657 10682, Proj. 7031, Task 703103
ASD TDR63 860 Unclassified report

Report on Research in Active Network Theory.

Descriptors: (*Tunnel diodes, Circuits), (*Circuits, Tunnel diodes), (*Networks, Tunnel diodes), Equations, Resistance (Electrical), Capacitance, Gain, Integral equations, Mathematical models, Negative resistance circuits, Special functions (Mathematical)

Research showed that the use of tunnel diodes in RC network synthesis allows realization of arbitrary transmission zeros by means of grounded RC networks. The tunnel diode may be employed to either improve on the gain obtainable by passive realization techniques, or to obtain transfer functions which are neither RC-cascade nor RC-ladder realizable. A ladder network synthesis of positive real axis zeros is given realizing arbitrary gain. Then a cascade synthesis for right half-plane zeros is developed. Finally, it is shown that one tunnel diode, embedded in a network consisting of two paralleled RC ladders, is sufficient to realize any arbitrary transmission zeros. The diode requirements for this last realization are minimized. Lastly, brief consideration is given to the practical aspects of RC-tunnel diode synthesis. (Author)

AD-429 149 Div. 8
OTS price $5.60

Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
VT/4060.
Quarterly rept. no. 1, 1 Aug-30 Oct 63, by L. B. Woolaver. 24 Jan 64, 1v. Rept. no. B2711
Contract AF33 657 12291
Unclassified report

Descriptors: (*Photomultipliers, Test equipment (Electronics)), (*Solar cells, Specifications), Test sets, Electrical properties, Sensitivity, Capacitance, Noise (Radio), Costs, Measurement, Tests.

Efforts were directed toward the following tasks: equipment for testing photomultiplier tubes was designed, fabricated, and tested. Methods for measuring sensitivity, capacitance, noise performance, and d-c operating characteristics of photovoltaic cells were devised and the appropriate equipment fabricated. Measurements of sensitivity, capacitance, and d-c operating characteristics of three typical photovoltaic cells were made and the results tabulated. (Author)

AD-429 159 Div. 8, 5
OTS price $6.60

Motorola, Inc., Scottsdale, Ariz.
INVESTIGATION OF THE STABILIZATION OF PARAMETRIC AMPLIFIERS.
Final rept.,
by D. E. Allen and R. B. Butterton. 5 Dec 63, 57p.
Contract AF19 628 433, Proj. 4610, Task 461006
AFCRL 63 573 Unclassified report

Descriptors: (*Parametric amplifiers, Stabilization), (*Gain, Parametric amplifiers), K band, Radiometers, Theory, Microwave equipment, Superhigh frequency, Feedback amplifiers, Pumping (Electronics), Noise (Radio), Bandwidth, Intermediate frequency amplifiers, Feasibility studies, Radiofrequency power, Ultrahigh frequency, Varactor diodes, Klystrons, Waveguide circulators.

An investigation is described of new techniques for the stabilization of the gain of parametric amplifiers used in the front end of radiometer receivers. A summary of the basic theory of parametric amplifiers is given with emphasis on the degenerate mode of operation as applied to receiver front ends for microwave radiometry. The development of a 15.5 gc amplifier is described. This amplifier utilizes gain stability by feedback of a reference noise level to control the pump power. The amplifier has 17 db gain, 70 Mc bandwidth, and 3.0 db noise figure. The utilization of feedback results in a 15 to 1 improvement of gain stability for pump power changes. A 1.0 gc degenerate mode amplifier for use as the first stage of a radiometer i-f amplifier is developed. A feasibility study of a degenerate mode Ka-band parametric amplifier is described. (Author)

AD-429 160 Div. 8, 6
OTS price $3.60

IIT Research Inst., Chicago, Ill.
EVALUATION AND IMPROVEMENT OF RADAR BEACON SYSTEMS.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 63, by S. Kazel, R. D. Standley and P. P. Toulios. 30 Nov 63, 26p.
Contract DA36 039sc90693, DA Proj. 3C16 19 001; IITRI Proj. E179
Unclassified report

Descriptors: (*Radar beacons, Tunnel diodes), (*Tunnel diodes, Radar beacons), (*Microwave amplifiers, Tunnel diodes), Coherent radar, C-band, Stability, Doppler radar, Frequency modulation, Rotation, Guided missile antennas, Waveguide circulators, Tuned circuits, Bandpass filters.

Research was continued on the evaluation and improvement of coherent radar beacons and a study was made of the use of tunnel diodes, varactor diodes and other solid state devices for use in beacons. Novel tunnel-diode amplifier circuits were introduced for stable operation. Stability criteria were established by which these amplifier circuits can be made unconditionally stable. The operation of the Doppler tracking loop of a coherent radar was investigated with regards to two indices of performance: (1) low-deviation and (2) low rate-of-change of the input frequency modulation. Of particular interest is the case where the f-m modulation arises from rotation of the missile antenna. (Author)

AD-429 161 Div. 8, 26
OTS price $2.60

Pratt and Whitney Aircraft, East Hartford, Conn.
LIQUID METAL-HEATED SPACE RADIATOR-MOUNTED THERMIONIC GENERATOR.
Quarterly rept. no. 2, 1 Oct-31 Dec 63, by F. C. Harter. 31 Dec 63, 21p. Rept. no. 2303
Contract AF33 657 11320, Proj. 8173, Task 817305
25
Unclassified report

Descriptors: (*Thermionic converters, Heating), (*Heaters, Liquid metals), Manufacturing methods, Tungsten alloys, Rhenium alloys, Cesium, Cleaning, Test sets, Tests, Test equipment, Vacuum apparatus, Vacuum pumps, Degasification.

Efforts were continued on a program for the Air Force to evaluate thermionic generators suitable for liquid-metal heating in space radiator configurations. The thermionic generator incorporates a tantalum alloy liquid metal containment tube insulated from a tungsten-rhenium alloy emitter by beryllia. During this report period (1 October to 31 December 1963) the work primarily involved the fabrication of generator subassemblies. As part of this program, Pratt & Whitney Aircraft will deliver two generators and a test system to the Air Force. The test system was designed and constructed during this quarter. (Author)

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AD-429 176 Div. 8
OTS price $7.60

Micro State Electronics Corp., Murray Hill, N. J.
LOW NOISE TUNNEL DIODE MIXERS AND CONVERTERS.
Final rept.,
by Stuart Becker, Gerald Hiller and Raoul Pettai. 17 Dec 63, 70p.
Contract AF30 602 2631, Proj. 5573, Task 557301
RADC TDR63 561 Unclassified report

Descriptors: (*Frequency converters, Tunnel diodes), (*Mixers (Electronics), Tunnel diodes), (*Tunnel diodes, Frequency converters), Noise (Radio), X-band, Ultrahigh frequency, Electric potential, Electrical conductance, Stability, Gain, Test methods, Measurement, Radiofrequency power, Temperature, Equations, Germanium, Gallium alloys, Antimony alloys.

The experimental and theoretical results are described of a program to develop and construct low-noise tunnel diode mixers and converters. Studies lead to a conclusion that reasonably low noise figures are possible when the diode is biased near the valley. This allows the tunnel diode converter to be operated with positive input and output conductances which simplifies the stability problem. The possibility of conversion gain with positive terminal conductances is also discussed. Assumptions which limit the accuracy of the theoretical results are pointed out. A separate section is devoted to the theory of measurement techniques and apparatus. (Author)

AD-429 178 Div. 8, 12
OTS price $5.60

Upper Air Research Labs., U. of Utah, Salt Lake City.
RADIATION HARDENING THE STANDING WAVE IMPEDANCE PROBE,
by L. C. Howlett, J. P. Evans and K. D. Baker.
19 Dec 63, 48p. SR1
Contract AF19 628 447, Proj. 8653, Task 865302
AFCRL 63 753 Unclassified report

Descriptors: (*Probes (Electromagnetic), Radiation damage), Hardening, Gamma rays, Neutrons, Electrical impedance, Fixed resistors, Fixed capacitors, Tantalum capacitors, Carbon resistors, Electric insulation, Printed circuits, Tests, Mica capacitors, Ceramic capacitors, Semiconductors.

The radiation hardening process for the Standing Wave Impedance Probe is discussed. Included in this process is the selection of radiation resistant components on the basis of a literature search, gamma radiation testing, and neutron radiation testing conducted by the Upper Air Research Laboratories. Indications were that many of the semiconductors, resistors, and insulators used in the original Impedance Probe were unreliable in a radiation environment such as encountered in the nuclear powered Agena satellite 626. This environment is expected to consist of a yearly radiation dose of 5 x 10 to the 12th power neutrons/cm square and 5 x 10 to the 7th power gamma rads. The choice of radiation resistant components based on the literature search findings was substantiated by a gamma radiation test at 7.5 x 10 to the 4th power rad/hr and a neutron radiatiwn test supplying a total dose of 4 x 10 to the 13th power neutrons/cm square. (Author)

AD-429 185 Div. 8, 15
OTS price $3.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
A GRAPHIC TECHNIQUE FOR RADOME RAY ANALYSIS,
by Paul J. Carroll. 27 Jan 64, 31p.
NADC EL 6368 Unclassified report

Descriptors: (*Radomes, Trigonometry), Polarization, Radar antennas, Equation, Electromagnetic waves, Analysis, Geometric forms, Mathematical analysis, Antenna radiation patterns.

A method is presented for applying ray tracings to a standard set of radome prints to determine component values of the angles of incidence of radar antenna radiation iminging on a radome wall. Equations are developed that determine the true angles of incidence and polarization as a function of these component angles; a sample ray study is illustrated; and a tapered, half-wave solid-wall design is presented. (Author)

AD-429 200 Div. 8
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIPLEXER USING SIDE-WALL COUPLERS IN ONE-HALF HEIGHT LARGE X-GUIDE,
by J. A. Kostriza. 17 Jan 64, 12p.
Contract AF19 628 500
ESD TDR64 22 Unclassified report

Descriptors: (*Waveguide couplers, Mathematical model, Scattering, Matrix algebra, Frequency.

A diplexer in one-half height large X-guide uses side-wall couplers. The analysis is based on the scattering matrix approach. A compact unit is made possible because of an abrupt 180 degree E-plane bend. (Author)

AD-429 212 Div. 8
OTS price $6.60

Adler Electronics, Inc., New Rochelle, N. Y.
GENERATOR, SIGNAL SG-297 ( )/URM-103.
Final rept. 18 June 58-8 Mar 63,
by J. Julie. 8 Mar 63, 1v.
Contract DA36 039SC78106, Proj. DA3 89 21 727
Unclassified report

Descriptors: (*Radiofrequency generators, Frequency modulation), (*Transistors, Radiofrequency generators), Mechanical properties, Containers, Packaged circuits, Production, Performance (Engineering), Circuits, Signal generators, Specifications, Configuration.

Development of the signal generator was done in two phases. The first phase resulted in the development and manufacture of two engineering test models; the second phase included a redevelopment and improvement program and the manufacture of seven service test models. The development program is broken down into tasks, each task dealing with an individual function or module. Complete description of the process by which the best solution was arrived at is given, supplemented with schematics and photographs. Also described is the redevelopment program which resulted in considerable improvement of the service test models over the engineering test models. The major areas in which improvements were made are the resetability and distortion of the modulation. In addition, a number of mechanical and electrical refinements were incorporated to greatly improve the usefulness and ease of handling of the equipment. (Author)

AD-429 213 Div. 8
OTS price $8.10

Pacific Semiconductors Inc., Lawndale, Calif.
UTILIZATION OF NEW TECHNIQUES AND DEVICES IN INTEGRATED CIRCUITS.
Quarterly rept. no. 1, 1 May-31 July 63.
31 July 63, 81p.
Contract AF33 657 11185
Unclassified report

Descriptors: (*Integrated circuits, Computer storage devices), (*Computer storage devices, Transistor amplifiers), Thin films (Storage devices), Resistors, Capacitors, Transistors, Diodes (Semiconductor), Gain, Bandwidth, Feedback amplifiers, Feedback, Gates (Circuits), Manufacturing methods.

Efforts in the utilization of new techniques and devices in integrated circuits are presented on Contract AF 33(657)-11185. The effort was primarily directed toward the design of compatible circuit techniques and structures for integrated circuits. Review of the Read Amplifier requirements were made, circuit designs considered and evaluated. Following contemporary circuit practice but applicable to parasitic parameters found in the integrated circuit construction, a satisfactory design for the Read Amplifier was found. Breadboard tests using components simulating the integrated circuit parameters indicate gain-bandwidth products approaching f sub t of the bipolar transistor are realizable. Processing work on all phases of integrated circuit fabrication was carried out. New techniques in this area include investigation of small structure fabrication for diffused components, and the Insulated Gate Field Effect Transistor. (Author)

AD-429 220 Div. 8, 15
OTS price $12.50

Cooley Electronics Lab., U. of Michigan, Ann Arbor.
THEORY OF SIGNAL DETECTABILITY. OBSERVATION-DECISION PROCEDURES,
by T. G. Birdsall and R. A. Roberts. Jan 64, 164p. Technical rept. 136, 3674 4T
Contract Nonr1224 36
Unclassified report

Descriptors: (*Statistical processes, Decision making), Signals, Functions, Errors, Sequential analysis, Probability, Monte Carlo methods, Signal to noise ratio.

The theory of signal detectability is extended to include observation-decision procedures other than the familiar fixed observation-decision procedure. The theory of signal detectability usually partitions detection devices into two cascaded sections. The first section processes the physical waveform and, in the optimum decision device, has as an output the likelihood ratio of the input waveform. The second section operates on the output of the first and its output is the actual decision signal present or signal absent. In much of the work in the literature the emphasis is placed on studying the first section with the second section a simple threshold device. In this work we study the second section. The observation-decision procedures studied include predetermined nonsequential procedures and the optimum (Bayes') sequential procedure, deferred decision. The comparision of the optimum nonsequential procedure and deferred decision are roughly the follOwing: if the available output signal-to-noise ratio which one would obtain is small, then sequential procedures consume about 60% as much time as nonsequential procedures and the resultant error probabilities are approximately the same; if the available output signal-to-noise ratio is on the order of +10 db, then deferred decision and the optimum non-sequential procedure consume about the same amount of time with sequential procedures making less terminal decision errors. (Author)

AD-429 229 Div. 8, 30
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
USE OF THE INTEGRAL CRITERION IN CERTAIN CONTROL PROBLEMS,
by B. A. Aref'ev. 16 Dec 63, 11p.
FTD TT63 1111 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye, 6:1, pp. 47-53, 1963.

Descriptors: (*Control systems, Energy), Mechanics, Integrals, Stabilization, Potential theory, Kinetic theory, Stabilized platforms.

A possible method is pointed out of calculating the integral energy and gives examples of using the corresponding criterion for certain control problems. A relationship is shown between the criterion under consideration and the usual integral estimates of quality. (Author)

AD-429 233 Div. 8
OTS price $4.60

Westinghouse Electric Corp., Elmira, N. Y.
DESIGN AND DEVELOPMENT INVESTIGATIONS OF A LOW NOISE, LINEAR, VARIABLE GAIN, R.F. AMPLIFIER TUBE.
Quarterly progress rept. no. 2, 30 Sep-31 Dec 63, by J. P. Pietrzyk, A. van der Jagt, and R. L. Pear. 15 Jan 64, 42p.
Contract NObsr89530, Proj. SS296004, Task 7481
Unclassified report

Descriptors: (*Electron tubes, Radiofrequency amplifiers), (*Radiofrequency amplifiers, Electron tubes), Noise (Radio), Tetrodes, Triodes, Cathodes (Electron tubes), Automatic gain control, Distortion, Electron tube parts, Electrical properties, Measurement, Tables, Gain.

Experiments were conducted with the conventional tube design and the slotted cathode design. The conventional tube constructions were made in two different designs: construction A, with a coated cathode area of .060 sq. in. and construction B, with a coated cathode area of .030 sq. in. The basic design of construction A, is established. Tetrodes, made in this design gave good results. Minor changes are expected to be made in this design. (Author)

AD-429 235 Div. 8, 30
OTS price $4.60

Illinois U., Engineering Experiment Station, Urbana.
A 500:1 SCALE MODEL OF WARLA A WIDE APERTURE RADIO LOCATION ARRAY,
by J. W. Greiser and G. S. Brown. Sep 63, 39p.
Technical report no. 2
Contract NObsr85243, Proj. SS024001
Unclassified report

Descriptors: (*Antenna configurations, Models (Simulations)), (*Direction finding, Broadband), (*Broadband, Antenna configurations), Micro-

wave frequency, Antenna radiation patterns, Digital computers, Mathematical prediction, Antenna lobes, Printed circuits, Standing wave ratios, Antenna feeds.

This report describes the design, construction, and testing of a microwave scale model of a circular array of broadband antennas. The ultimate goal of this work is the construction of a high gain direction finding array using frequency independent antennas which would permit efficient operation over the 2-32 Mc range. The scale model is an attempt to experimentally verify certain theoretical results which were obtained from calculations performed on a computer. Restructions imposed on the array by the necessity of keeping inter-element phase center spacings less than approximately .75 wavelengths have forced the use of three sets of log-periodic elements - one set being added for each higher frequency band. The model discussed here represents only the lowest frequency band of the full array. A scaled frequency range of 1000 to 2500 Mc (array diamter of 29 in.) which corresponded to the 2-5 Mc range (array diameter of 1210 ft.) was employed as the model frequency limits. Typical radiation patterns of the model are presented and their relation to computed patterns are discussed. (Author)

AD-429 249 Div. 8
OTS price $7.60

Motorola, Inc., Scottsdale, Ariz.
EXTENSION OF ELECTRONIC EQUIPMENT LIFE PREDICTION STUDY.
Final rept., 1 Apr-30 Sep 63,
by A. T. Kneale, M. Esher and G. D. Hase.
31 Jan 64, 65p. Rept. no. WP2643 7
Contract DA36 039sc87235
Unclassified report

Descriptors: (*Electronic equipment, Performance (Engineering)), (*Radio equipment, Performance (Engineering)), Matrix algebra, Test sets, Test equipment (Electronics), Instrumentation, Radio communication systems, Integral equations, Life expectancy, Measurement, Reliability (Electronics), Mathematical predictions, Correlation techniques, Data processing systems.

The aim of this program was to prove the feasibility of providing field instrumentation capable of measuring the rate of degradation of performance in individual electronic devices. The major work accomplished was as follows: (1) selection of the type of equipment to be analyzed and instrumentation for the tests to be performed, (2) analysis of the instrumentation selected for performing the measurement required, (3) analysis of the mathematical approach to be utilized, (4) correlation of computer output with equipment performance, and (5) analyzing the different approaches used for accuracy of prediction. (Author)

AD-429 285 Div. 8, 30, 25
OTS price $13.00

Institute for Cooperative Research, U. of Pennsylvania, Philadelphia.
THE DEVELOPMENT OF MEASURING SYSTEMS FOR PRIMARY CALIBRATION OF ORDNANCE CORPS TEST EQUIPMENT.
Final rept. phase 1, 1 June 62-31 Oct 63.
Dec 63, 1v.
Contract DA36 034ORD3693
Unclassified report

Descriptors: (*Measuring devices (Electrical & electronic), Ordnance laboratories), (*Test equipment (Electronics), Calibration), (*Ordnance laboratories, Test equipment (Electronics)), Measurement, Moisture, Lasers, Power, Photoelectric cells (Semiconductor), Photosensitivity, Ionization, Radiofrequency power, Microwave frequency, Superhigh frequency, Extremely high frequency, Coaxial cables, Waveguides, Transducers, Strain gages, Pressure, Standards.

Contents: Moisture Content Measuring Techniques; Laser Output Energy Measurements; Development of a Coaxial Microwave Power Standardization for 3 KMC; Development of a Waveguide Microwave Power Standardization for 33 KMC; Development of a Pressure Transducer Standard in the Range 100-200,000 PSI.

AD-429 299 Div. 8, 26
OTS price $3.60

General Electric Co., Schenectady, N. Y.
PRODUCTION ENGINEERING MEASURE FOR VOLTAGE-TUNABLE MAGNETRONS.
Quarterly progress rept. no. 5, 19 Apr-18 July 63,
by W. M. Piwnica. 18 July 63, 32p.
Contract DA36 039sc86722
Unclassified report

Descriptors: (*Magnetrons, Manufacturing methods), Electric potential, Tungsten alloys), Thorium compounds, Oxides, Vibration, Production, Cavity resonators, Electron tube heaters, Tuning devices.

Efforts were continued on the establishment of PEM for voltage-tunable magnetrons. The remaining packages were delivered to fulfill the requirements of 14 ZM-6103 (formerly Z-5364) and 14 ZM-6104 (formerly ZM-6001) VTM packages. Work conducted resulted in improved vibration performance for both package types and in improved noise performance for the ZM-6104 package. An improved method for treating thoriated-tungsten emitters (filaments) is being evaluated. The evaluation of prototype cast cavities was completed with positive results. The design of both package types, incorporating the latest improved, was completed. (Author)

AD-429 308 Div. 8
OTS price $3.60

Navy Electronics Lab., San Diego, Calif.
LINEAR DIGITAL CORRELATOR (DICOR),
by M. H. Mott and A. T. Roome. 8 Nov 63, 32p.
NEL 1194 Unclassified report

Descriptors: (*Radar signals, Correlation techniques), (*Correlators, Radar signals), Digital systems, Coding, Computer logic, Matched filters, Printed circuits, Transistors, Tests, Performance (Engineering).

A linear digital correlator (DICOR) was built and tested in the laboratory. Its design evolved from investigations of matched filtering of coded-pulse radar signals utilizing digital techniques. DICOR represents an attempt to find an economical means of eliminating or reducing the strong-signal-capture effect which leads to complexity and high cost in digital matched filters. Laboratory performance of DICOR agreed with theoretical predictions for a seven-element coded signal. The basic DICOR unit is reproducible in large quantities, is of reasonable cost, and uses commonly stocked components. (Author)

AD-429 315 Div. 8
OTS price $8.10

Sperry Microwave Electronics Co., Clearwater, Fla.
DEVELOPMENT OF C-BAND BEACON FERRITE DUPLEXER PHASE III.
Final rept., Feb 62-Oct 63.
Oct 63, 1v. Rept. no. 4
Contract DA36 039sc89158, Proj. 1G6 22001A055
Unclassified report

Descriptors: (*Radar duplexers, C-band), (*C-band, Radar duplexers), (*Limiters, Varactor diodes), (*Varactor diodes, Limiters), Power, Magnetic fields, Resonance, Standing wave ratios, Attenuation, Broadband, Semiconductor devices, Ferrites, Filters (Electromagnetic wave), Manufacturing methods.

Several possible approaches to the required C-band duplexer-limiter package were considered to meet the stringent electrical and mechanical requirements. Two principal designs were evaluated: (1) a four-port junction circulator used in conjunction with a high power coaxial load and broadband fixed-tuned gyromagnetic coupling limiter, and (2) the same circulator and load but with a low-threshold subsidiary resonance limiter followed by a varactor limiter. In the course of the program the latter configuration was chosen as the most promising approach. Both approaches are discussed to the extent to which they were investigated. Final results of the program are presented. It is shown by final data that the original design goals were essentially met. (Author)

AD-429 319 Div. 8, 30
OTS price $3.60

Westinghouse Electric Corp., Washington, D. C.
500 WATT SILICON POWER TRANSISTOR.
Quarterly rept. no. 1, 31 July-30 Oct 63.
30 Oct 63, 1v.
Contract NObsr91001, Proj. SR0080304, Task 9347
Unclassified report

Descriptors: (*Transistors, Power), (*Silicon, Transistors), (*Test methods, Transistors), Stability, Frequency, Electric potential, Measuring devices (Electrical and Electronic), Electric current, Temperature, Physical properties.

A method of testing power transistors for secondary breakdown behavior is described. Test results obtained on transistors manufactured by several different processes are discussed. It was found that secondary breakdown occurs in the collector-base connection as well as in the collector-emitter mode. Test results are analyzed in terms of junction breakdown, avalanche-limited and punch-through limited transistor breakdown, and thermal runaway. Approaches to design of the subject transistor are evolved from consideration of test results. (Author)

AD-429 335 Div. 8, 26
OTS price $5.60

Thermo Electron Engineering Corp., Waltham, Mass.
ADDITIVE CONVERTER STUDIES.
Final rept. Nov 62-Nov 63,
by S. S. Kitrilakis and J. H. Weinstein. Jan 64, 55p. Rept. no. 35 64
Contract AF33 657 10130, Proj. 8173, Task 817305
APL TDR64 2 Unclassified report

Descriptors: (*Thermionic converters, Effectiveness), (*Electrodes, Refractory materials), (*Temperature, Electrodes), Cesium compounds, Electric current, Electric potential, Seals (Stoppers), Ceramic materials, Vapors, Heating elements, Performance (Engineering), Halides, Tungsten, Molybdenum, Fluorides, Power, Rhenium, Nickel alloys, Copper alloys.

Results of a program aimed at improving the performance of thermionic converters through the use of cesium halide additives are reported. These results show that such improvement is achieved and is due to the reduction of collector work function at each operating condition. The reduction in work function is achieved by a shift in the ratio of collector-to-cesium reservoir temperature ratio at which the minimum collector work function is obtained, thus allowing the converter to be operated closer to the condition of minimum collector work function than is useful in the cesium-only case. It is also reported that corrosion and metallurgical examinations show no evidence of chemical attack upon converter components, which can be attributed to the additives. (Author)

AD-429 347 Div. 8
OTS price $2.60

SFD Labs. Inc., Union, N. J.
DEVELOPMENT OF AN X-BAND CW CROSSED-FIELD AMPLIFIER.
Interim development rept., 30 Sep-31 Dec 63,
by M. Arnum. 28 June 63, 25p. Rept. no. 33IDR2
Contract NObsr89503, Proj. SF0100201
Unclassified report

Descriptors: (*Microwave amplifiers, X-band), Impedance matching, Wave transmission, Electrical impedance, Measurement, Waveguides, Waveguide couplers, Phase measurement, Equations.

Circular versions of slow wave structures capable of meeting the required specifications of the program have been evaluated at cold test. Major emphasis has been placed on obtaining comparative electronic interaction impedance values for the circuits and on obtaining an acceptable impedance match for the circuits across the frequency band of interest. Of particular significance is the fact that an interdigital line design with increased coupling impedance in comparison to that of the conventional interdigital line has been obtained. Construction of a second version of such a circuit has been initiated. The interaction impedance of this second version is expected to be further enhanced. (Author)

9. FLUID MECHANICS

AD-427 971 Div. 9, 25
OTS price $2.60

AVCO Everett Research Lab., Everett, Mass.
EVIDENCE FOR THE EXISTENCE OF N- FROM THE CONTINUUM RADIATION FROM SHOCK WAVES,
by R. A. Allen and A. Textoris. Oct 63, 22p.
rept. no. RN399
Contract AF04 694 33
Unclassified report

Descriptors: (*Shock waves, Thermal radiation), Aerodynamic heating, Air. Nitrogen, Dissocation, Ions, Density, Temperature, Electron capture, Absorption spectrum, Photometers, Measurement, Atmosphere entry.

This work represents a study of the continuum radiation from shock-heated air and nitrogen as a function of density and temperature. For air or nitrogen in which the molecules are completely dissociated yet only partially ionized, radiation produced by the interaction of electrons with neutral atoms will have a stronger density dependence than the radiation produced by electron interaction with positive ions. Intensity measurements of the continuum at 5000 A were made on the equilibrium region behind incident air and nitrogen shocks in the 9 to 11 Mm/micro sec range at initial pressures of from 0.1 mm Hg to 1.0 mm Hg. At higher densities, enhanced radiation is observed which can be attributed to the interaction of free electrons with neutral nitrogen atoms. Strong evidence suggests that this radiation is produced by the capture of electrons by nitrogen atoms in the (2D) state. A photoabsorption cross section of 2.6 x 10 to the minus 16th power sq cm for the N-(D) atom at 5000 A is deduced from the measurements. Besides indicating that a strong N- continuum exists, these new measurements of Kramers' radiation also indicate that the positive ion radiation contributes less than previously expected and supports the theoretical calculations of Biberman and Norman for the N+ free-bound radiation. (Author)

AD-428 024 Div. 9
OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
AN INTEGRAL INVARIANT OF A CLASS OF STEADY-STATE VISCOUS-INCOMPRESSIBLE FLOWS,
by Paul Lieber and Koon-Sang Wan. Nov 63, 15p.
Rept. no. MD63 3
Contract Nonr222 87
Unclassified report

Descriptors: (*Hydrodynamics, Incompressible flow), Fluid mechanics, Fluid flow, Viscosity, Turbulence, Vortices, Integral equations, Partial differential equations, Atmospheric motion, Ocean currents.

Conditions for and properties of the invariance are considefed of an integral which represents a global measure of uniformity of a class of steady-state viscous incompressible flows. This integral is related to the forces which account for the inherent non-linear structure of the Navier-Stokes equations. The condition of global constraint on flow fields rendered by its properties of invariance is therefore tantamount to a condition on the non-linear structure of the classical equations of hydrodynamics. For each and every member of the sub-class of steady-state flows which extend over an infinite domain, the integral is numerically equal to zero. Consequently it is a numerical invariant of this important sub-class of steady-state viscous incompressible flows. (Author)

AD-428 029 Div. 9
OTS price $4.60

Naval Weapons Lab., Dahlgren, Va.
GENERAL LAMINAR FLOWS PAST LEADING AND TRAILING EDGES OF A SEMI-INFINITE PLATE.
by Hans J. Lugt and Ernst W. Schwiderski.
Oct 63, 1v.
NWL 1887 Unclassified report

Descriptors: (*Laminar flow, Flat plate models), (*Aerodynamic control surfaces, Laminar flow), Leading edge, Trailing control surfaces, Theory, Partial differential equations, Gas flow, Equations, Motion.

The characteristics of general laminar flows around the edge of a semi-infinite flat plate are investigated on the basis of the complete Navier-Stokes equations. The solution of this singular and nonlinear problem is obtained in an exact and linear manner in the form of a double series around the edge. It permits a rigorous discussion of the properties of flows around an edge, which are of importance in the practical applications as well as in the theory of viscous and nonviscous fluid motions. In particular, it becomes possible to check the reliability of the Kutta condition which represents a fundamental proposition in ideal flow theory. (Author)

AD-428 079 Div. 9
OTS price $3.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
SOLUTION OF THE GENERAL BOUNDARY-LAYER EQUATIONS FOR COMPRESSIBLE LAMINAR FLOW, INCLUDING EQUILIBRIUM DISSOCIATION,
by Darwin W. Clutter and A. M. O. Smith.
1 Nov 63, 37p. Douglas paper 1657
Contract NOw60 0553c
Unclassified report

Presented at the Sixth BOWACA Symposium on Aeroballistics, 31 Oct-1 Nov 63, at Washington, D. C.

Descriptors: (*Laminar boundary layer, Equations), Conical bodies, Fluid flow, Heat transfer, Pressure, Mathematical analysis, Fluid mechanics, Cylindrical bodies, Blunt bodies, Flat plate models, Digital computers, Numerical analysis, Compressible flow.

An accurate and rapid method is presented for solution of the complete equations of compressible, steady, laminar-boundary-layer flow. The method allows arbitrary conditions for all of the following: pressure gradient, surface temperature and its gradient, heat transfer, mass transfer, and fluid properties. It can handle flows in which equilibrium dissociation occurs. Also, the second-order effect of transverse curvature is retained. The only restrictions are geometric. The method of solution consists of replacing the partial derivatives with respect to the flow direction by finite differences, while retaining the derivatives in a direction normal to the boundary. Arbitrary fluid properties may be used in the method of solution, if they are inputs in the computer program in the form of formulas or tables. The method has been programmed on an

IBM 7094 computer, and solutions for a variety of flows are presented. Comparisons are made with other exact and approximate methods and with experiment. Calculations and comparisons establish that the method is rapid, highly accurate, and powerful. (Author)

AD-428 140 Div. 9, 1, 15
OTS price $6.60

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
POWER SPECTRAL DENSITY TECHNIQUES APPLICABLE FOR STRUCTURAL DESIGN CRITERIA AND ANALYSIS STATE-OF-THE-ART REPORT,
Rept. for Feb-Dec 61,
by Leon J. Bowser. May 62, 1v.
Proj. 1367; Task 136702
ASD ASRMDS TM62 4 Unclassified report

Report on ''Structural Design Criteria''.

Descriptors: (*Airframes, Mathematical analysis), Reviews, Structures, Wings, Design, Optimization, Statistical analysis, Integral transforms, Aerodynamic loading, Gust loads, Stresses, Fatigue (Mechanics), Deflection, Pitch (Motion), Damping, Jet bombers, Jet transport planes, Turbulence, Mathematical prediction.

A review and analysis is presented of the state-of-the-art regarding application of power spectral density techniques to structural design criteria. The primary objective is to make available a convenient reference giving an organized, readable answer to the questions regarding applications of power spectral techniques as well as the potentialities of this tool in helping to solve complex engineering and design problems. In addition, the report includes a detailed account of some Aeronautical Systems Division experience in applying these techniques, and a brief introduction to spectral analysis techniques. (Author)

AD-428 149 Div. 9, 31
OTS price $4.60

David Taylor Model Basin, Washington, D. C.
A METHOD FOR PREDICTING SLAMMING FORCES ON AND RESPONSE OF A SHIP HULL,
by Ralph C. Leibowitz. Sep 63, 42p.
DTMB 1691 Unclassified report

Descriptors: (*Ship hulls, Water waves), (*Water waves, Ship hulls), Digital computers, Excitation, Transients, Hydrodynamics, Measurement, Theory, Analysis, Motion, Fluid flow, Momentum, Buoyancy, Elasticity, Stresses, Impact shock, Load distribution.

This report describes a method for obtaining digital computer solutions for the excitation forces on and transient response of a ship subject to (hydrodynamic) slam when certain basic data are obtained by computation rather than by measurement. The method is based on a theory shown in TMB Report 1511 to be in good agreement with experiment for a particular application. (Author)

AD-428 157 Div. 9
OTS price $4.60

Institute of Aerophysics, U. of Toronto (Canada).
PRESSURE MEASUREMENT IN TRANSITION AND FREE MOLECULAR FLOWS USING ORIFICE PROBES,
by J. C. Lafrance. Dec 63, 34p.
Contract AF33 616 6990, Proj. 7064, Task 7064 01
ARL 63 222 Unclassified report

Report on Aerothermodynamic Investigations in High Speed Flow.

Descriptors: (*Hypersonic flow, Test equipment), (*Aspect ratio, Low pressure research), Cylindrical bodies, Flat plate models, Pressure gages, Instrumentation, Vacuum apparatus, Orifices, Gas flow, Kinetic theory, Superaerodynamics.

When bodies travel in a gas so rarefied that the mean-free-path of the molecules is much larger than any of the dimensions of the body the aerodynamic properties of the body can be calculated using kinetic theory ignoring the collision between the molecules that have struck the body and those directed towards it. At slightly higher densities such collisions start to become of importance and deviations from the free-molecular theoretical results will occur. A series of experiments, performed in a rotating arm apparatus to study the deviations from free-molecular flow that occur at low subsonic speeds, are described. The specific criterion used in these tests was the pressure measured by an orifice probe in the walls of cylinders and flat plates of rectangular and circular shape which were perpendicular to the flow direction. It was found that the deviations from free-molecular flow depend on both dimensions perpendicular to the flow in relation to the mean-free-path and on the speed ratio. (Author)

AD-428 210 Div. 9, 25
OTS price $3.00

Northwestern U., Evanston, Ill.
PARTITION FUNCTIONS AND THERMODYNAMIC PROPERTIES OF HIGH TEMPERATURE GASES,
by Kenneth S. Drellishak. Jan 64, 148p.
Contract AF40 600 972, Task 895104
AEDC TDR64 22 Unclassified report

Descriptors: (*Gases, Thermodynamics), High temperature research, Statistical mechanics, Dissociation, Ionization, Plasma medium, Argon, Nitrogen, Oxygen, Pressure, Temperature, Particles, Rotation, Molecules, Atoms.

Assuming a mixture of perfect gases consisting of atoms, molecules (neutral and singly ionized), negative atomic ions, electrons and up to four positive atomic ions, the equilibrium composition, internal partition functions and thermodynamic properties of argon, nitrogen and oxygen plasma were calculated by the methods of statistical mechanics for six pressures (0.01, 0.1, 0.5, 1.0, 2.0 and 5.0 atmospheres) at 100 K increments for temperatures up to 35000 K. Tables and figures include internal partition functions for all heavy species, chemical composition, mass density, entropy, internal energy, enthalpy Gibb's and Helmholtz free energies, specific heats at constant pressure and volume, the effective gamma and equilibrium sound speed. (Author)

AD-428 238 Div. 9, 27
OTS price $10.10

United Aircraft Corp., East Hartford, Conn.
TURBULENT BOUNDARY LAYER CHARACTERISTICS, IN SUPERSONIC STREAMS HAVING ADVERSE PRESSURE GRADIENTS,
by George H. McLafferty and Robert E. Barber.
Sep. 59, 124p. Rept. no. R1285 11
Contract NOas55 133c
Unclassified report

Descriptors: (*Duct inlets, Supersonic characteristics), (*Turbulent boundary layer, Duct inlets), Curved profiles, Wind tunnel models, Supersonic flow, Pressure, Jet mixing flow, Separation, Shock waves, Schlieren photography, Turbojet inlets.

Investigations were conducted to determine the thickness and profile shape characteristics of turbulent boundary layers in supersonic streams having adverse pressure gradients similar to those which are encountered in supersonic inlets. The program included tests conducted at Mach numbers from 2.0 to 3.5 using two-dimensional and axisymmetric curved-surface models to produce the adverse pressure gradients. The magnitude of the gradients relative to the boundary layer thickness at the beginning of the gradient was varied by employing models having different radii of curvature and by changing the boundary layer thickness at the beginning of the gradient. The over-all pressure rise in most cases was greater than the value which would cause a turbulent boundary layer to separate if the pressure rise were created by an oblique shock wave. Some tests were conducted to determine the effect of boundary layer removal from the curved surfaces on boundary layer growth and on the pressure gradients which could be realized without separation. An analytical investigation was also conducted so that the results of the experimental investigation could be applied to the prediction of cases outside the range of the experiments. (Author)

AD-428 322 Div. 9, 25
OTS price $3.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
HYPOTHESIS ON UNIVERSAL EJECTION PROPERTIES OF TURBULENT JETS OF GAS, AND ITS APPLICATION,
by O. V. Yakovlevskii, tr. by Ingeborg V. Baker.
20 Dec 63, 34p.
RSIC 108 Unclassified report

Trans. from Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk, Metallurgiya i Toplivo, No. 3, pp. 40-54, 1961.

Descriptors: (*Jets, Ejection), Turbulence, Gases, Fluid dynamic properties, Equations, Velocity, Thermodynamics, Incompressible flow, Supersonic characteristics, Liquids, Attenuation, Jet mixing flow.

The hypothesis on universal ejection properties of turbulent jets of gas and its application is presented. (Author)

AD-428 377 Div. 9
OTS price $2.60

Mississippi State U., State College.
SOME CHARACTERISTICS OF THE TURBULENT BOUNDARY LAYER.
Dec 63, 21p. Rept. no. ARN18
Contract DA44 177AMC892T, Task 1D121401A14203
ATRECOM TR63 74 Unclassified report

Descriptors: (*Turbulent boundary layer, Theory), Curve fitting, Wake, Functions, Integration, Equations.

A theoretical investigation was made of the turbulent boundary layer. The purpose was to derive relations on the characteristics of the boundary layer and to compare them with experimental data. (Author)

AD-428 481 Div. 9
OTS price $3.60

Bureau of Reclamation, Denver, Colo.
USE OF AN ELECTRONIC COMPUTER TO OBTAIN FLOW NETS FOR A CHANNEL WITH 90 DEGREES INTO-THE-FLOW OFFSETS,
by H. T. Falvey. 15 Nov 63, 28p.
BR D HYD500 Unclassified report

Descriptors: (*Fluid flow, Interference), Programming (Computers), Theory, Hydrodynamics, Velocity, Pressure, Boundary layer, Mathematical analysis, Fluid mechanics, Deflection, Data processing systems, Digital computers.

A study was made to develop a computer program for evaluating an exact mathematical expression for flow in a channel with various 90 degrees into-the-flow offsets. The program would be used to compute the pressure coefficient, the vertical and horizontal components of the relative velocity, and the resultant relative velocity at any point in the channel. (Author)

AD-428 498 Div. 9
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
DETERMINATION OF INDUCTION TIMES IN ONE-DIMENSIONAL DETONATIONS,
by G. J. Mullaney and R. Arave. Dec 63, 24p.
Document no. D1 82 0324, FSL87
Unclassified report

Also available from the author.

Descriptors: (*Detonations, Shock waves), (*Shock waves, Convergent-divergent nozzles), One-dimensional flow, Shock tubes, Combustion, Reaction kinetics, Chemical reactions, Schlieren photography, Thermodynamics.

One-dimensional detonations are established in a converging-diverging nozzle at low initial pressures. Pulsed light schlieren photography displays the shock wave and the density gradient which signals the beginning of rapid chemical reaction after the induction period. Induction time (τ) has been studied over the ranges $880 \leq T \leq 1600$ K, $15 \leq p1 \leq 40$ mmHg and $2.5 \leq \tau < 21$ microsec for the hydrogen-oxygen reaction. Data are presented mostly for 2H2 + O2 + 3.76N2, and 2H2 + O2 + 4A and compared with that obtained theoretically in other kinetic studies. Schlieren photographs taken when a weak shock passes over the combustible mixture show some of the features of detonation formation. (Author)

AD-428 533 Div. 9
OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THEORETICAL BASE PRESSURE ANALYSIS OF AXISYMMETRIC EJECTORS WITHOUT INDUCED FLOW,
by R. C. Bauer. Jan 64, 40p.
Contract AF40 600 1000, ARO Proj. RW2141
AEDC TDR64 3 Unclassified report

Descriptors: (*Ejectors, (Ordnance), Supersonic flow), Pressure jets, Theory, Compressive flow, Viscosity, Experimental data, Energy, Mixtures, Configuration, Errors, Shock waves, Diffusers, Nozzles, Gases, Temperature.

The two-dimensional supersonic base pressure theory developed by Dr. H. H. Korst, which applies to two-dimensional systems with straight jet boundaries, has been modified to be more applicable to axisymmetric ejector systems. The modification consists of a new theory for estimating the peak recompression static pressure which is applicable to either axisymmetric or two-dimensional jets having straight or curved boundaries. Significantly, the recompression mechanism is not independent of viscous effects for systems which produce a non-uniform inviscid flow field. Both the recompression theory and the modified base pressure theory are experimentally verified for the case of isoenergetic mixing and negligible initial boundary layer. The recompression theory is shown to agree with experimental results to within ±10% whereas the experimental base pressure results have a standard deviation of 6% with respect to the modified base pressure theory. (Author)

AD-428 550 Div. 9, 1
OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright Patterson Air Force Base, Ohio.
EQUATION OF MOTION OF AN AIRCRAFT WITH A JET ENGINE,
by G. M. Trakhtenberg. 7 Oct 63, 35p.
FTD MT63 94 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika, no. 4, pp. 36-56, 1962.

Descriptors: (*Jet planes, Aerodynamic characteristics), Automatic pilots, Equations, Motion, Weight, Load distribution, Mechanics, Turbojet engines, Gravity, Velocity, Differential equations, Flight, Damping, Fuel tanks, Theory.

Equations are given for the motion of an aircraft with a jet engine with variable mass and moments of inertia. The position of the engine and tanks of fuel mixture are considered relative to the center of gravity of the aircraft. For an increase of damping of an aircraft it is expedient to place the jet engine behind the center of gravity at a significant distance. (Author)

AD-428 552 Div. 9
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABOUT TRANSITION OF A LAMINAR BOUNDARY LAYER INTO A TURBULENT ONE AT JET FLOWING AROUND A PLATE,
by L. A. Vulis, Z. B. Sakipov and A. T. Trofimenko. 26 Sep 63, 15p.
FTD MT63 84 Unclassified report

Trans. from Izvestiya An SSSR, Otn, Mekhanika I Mashinostroyeniye, no. 3, pp. 53-60, 1962.

Descriptors: (*Boundary layer transition, Fluid flow), Laminar flow, Turbulence, Jet mixing flow, Gas flow, Water, Mathematical analysis, Model tests, Flat plate models, Laminar boundary layer.

Results are discussed of experimental investigation of the flow of flat stream of water or air along a plate. Transition of a laminar boundary layer into a turbulent one in a well developed turbulent flow in the external part of the stream was observed. (Author)

AD-428 563 Div. 9, 30
OTS price $4.60

Stanford U., Calif.
A GENERAL METHOD FOR NUMERICAL INTEGRATION THROUGH A SADDLE-POINT SINGULARITY WITH APPLICATION TO ONE-DIMENSIONAL NONEQUILIBRIUM NOZZLE FLOW,
Final rept.
by George Emanuel. Jan 64, 39p.
Contract AF40 600 930, Task 895210
AEDC TDR64 29 Unclassified report

Descriptors: (*Nozzle gas flow, Mathematical models), Integration, Numerical methods & procedures, Partial differential equations, Differential equations, Hypersonic flow, Frozen equilibrium flow, Hypersonic wind tunnels, Nozzles, One-dimensional flow.

A method for integrating numerically through a saddle-point singularity of an ordinary differential equation is presented. The solution of the differential equation is assumed to depend also on the value of a parameter, such as the mass flow. The method is thus applicable to a wide assortment of gas-dynamic problems including one-dimensional nonequilibrium nozzle flow and two-phase nozzle flow. Specific application is made to nonequilibrium nozzle flow, and the results of this application are presented and discussed. The method proved to be numerically accurate without requiring an exceedingly precise estimate for the critical mass flow. The work also includes a modification of a method for calculating approximate equilibrium nozzle flows. (Author)

AD-428 616 Div. 9, 12
OTS price $6.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
AERODYNAMIC HEATING AND STRUCTURAL TEMPERATURE RESPONSE,
by Stanley C. Browning. July 63, 1v. Rept. no. EPA11
Contract Nord16640
Unclassified report

Descriptors: (*Aerodynamic heating, Supersonic flight), Air, Equations of state, Supersonic flow, Boundary layer, Temperature, Heat transfer, Laminar flow, High altitude, Convection, Thermal radiation, Energy, Stability, Atmospherics, Velocity, Sound, Thermal insulation, Thermal conductivity, Guided missiles (Air-to-air), Guided missiles (Underwater-to-surface), Rocket motors (Solid propellant), Surface temperature, Rocket cases, Laminar boundary layer, Turbulent boundary layer.

A simplified method for determining the aerodynamic heating that occurs on vehicles traveling at high speeds is presented. Relations are submitted which permit the calculation of the temperature of the boundary layer and the heat transfer coefficient as a function of Mach number and altitude. Both laminar and turbulent flow within the boundary layer are considered and the method has been programmed for use with ABL automatic digital computation equipment. Equations for predicting structural temperatures resulting from aerodynamic heating are also presented and are incorporated into the over-all program in order that the effects of surface temperature on the aerodynamic heat input can be taken into account. The program can also be applied to problems other than those specifically having to do with aerodynamic heating. Heat flow in two

directions accounting for all modes of heat transfer and the variation of physical properties with temperature may be considered. (Author)

AD-428 630 Div. 9, 31
OTS price $3.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
THE APPLICATION OF FRIEDRICHS TECHNIQUE TO THE SHIP PROBLEM.
Final rept.,
by S. I. Ciolkowski. Nov 63, 35p. Rept. RE169
Contract Nonr3616 00
Unclassified report

Descriptors: (*Ship hulls, Hydrodynamics), Perturbation theory, Slender bodies, Fluid flow, Drag, Incompressible flow, Motion, Equations, Green's function, Water waves, Interference, Hydrodynamic configurations, Design, Mathematical analysis, Configuration.

The problem is considered of a ship moving with uniform velocity over a semi-infinite ocean at rest at infinity. An expansion procedure suggested by Professor K. O. Friedrichs is used to arrive at a perturbation of this problem. The perturbation problem is then solved by making use of a Green's function derived by Peters and Stoker. Green's theorem is applied to obtain the perturbation potential to the second order in the perturbation parameter. The corresponding problem of multiple hull ships is than solved. The wave resistance of the above ships is calculated and the problem of fixed displacement hull shapes having minimum wave resistance for the large Froude numbers is studied. (Author)

AD-428 671 Div. 9
OTS price $9.60

Bureau Technique Zborowski, Paris (France).
THEORETICAL INVESTIGATION AND CONTROL BY MEASURING TESTS ON THE BEHAVIOR OF THE THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER ON AN ANNULAR WING AT VARIOUS INCIDENCES.
Final rept.,
by Ernest A. Eichelbrenner, Serge Angioletti, Yves M. Grellier, and Rolf S. Hellerstrom.
15 Sep 63, 1v.
Contract N62558 3514
Unclassified report

Descriptors: (*Turbulent boundary layer, Three dimensional flow), (*Ring wings, Turbulent boundary layer), Equations, Test methods, Data, Polynomials, Functions, Integrals, Transformations (Mathematics), Theory, Convex bodies.

A method is given which permits the determination of the essential parameters of turbulent boundary layers in three-dimensional flow over essentially convex surfaces. This allows the construction of the entire field of wall streamlines over the turbulent parts of a given surface and, in particular, the determination of separation and reattachment lines. The inner organization of separated areas included by these lines can be experimentally obtained with the help of three complementary methods: visualization by ointment tests, visualization with kerosene vapors, and interpretation of constant pressure ratio results. Once these data are know, it is relatively easy to calculate the wall friction by means of the integrated momentum and energy equations in longitudinal and transversal direction and thus obtain a knowledge of flow characteristics in three dimensions otherwise impossible to be correctly measured. Systematic tests on the distribution of the form parameter and on the inner organization of separated areas are necessary for practical applications of the results. (Author)

AD-428 700 Div. 9, 30
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
MEASUREMENTS OF THE FLUCTUATING STATIC AND TOTAL-HEAD PRESSURES IN A TURBULENT WAKE,
by M. Strasberg. Dec 63, 27p.
DTMB 1779 Unclassified report

Descriptors: (*Wake, Instrumentation), (*Turbulence, Pressure gages), Stagnation point, Subsonic flow, Pressure, Measurement, Cylindrical bodies, Velocity, Errors, Wind tunnels, Aerodynamic characteristics, Noise.

The use of probe tubes for measuring the fluctuating static and stagnation-point pressures in subsonic turbulent wakes is discussed and estimates are made of the magnitude of several sources of error. It is shown that the mere presence of a probe tube in a turbulent flow causes the measured mean-square value of the fluctuating static pressure to exceed the true value by about (1/4) (rho v sub t squared) squared, where v sub t is the fluctuating velocity component normal to the tube. Although this error is just about equal to the magnitude of the fluctuations expected in isotropic turbulence, the fluctuations in shear flows can exceed the error by enough to be measurable. The results of measurements of fluctuating pressure made in the wake behind a cylinder are presented. Data are given on the rms values and the spectra of the fluctuating static and total-head pressures, and on the cross correlations of these pressures with the fluctuating velocity. (Author)

AD-428 797 Div. 9, 25
OTS price $8.60

Cornell U., Ithaca, N. Y.
THE DYNAMICAL EQUATIONS OF PARTIALLY IONIZED GASES,
by Gary D. Brinker. Sep 63, 87p.
Grant AF AFOSR62 201
Unclassified report

Descriptors: (*Gas ionization, Magnetohydrodynamics), Gas flow, Ionization, Mathematical models, Plasma oscillations, Plasma sheath, Boundary layer, Aerodynamic heating, Functions, Statistical functions, Equations, Transport properties, Kinetic theory.

The dynamical equations for each component of a partially ionized monatomic gas are presented in two forms. These formulations should be most useful in analyzing the effects of ionization in such nonequilibrium regions as plasma oscillation and boundary layers. Using a perturbed Maxwellian distribution to evaluate the collision integrals, the appropriate transfer equations for the multi-component gas have been given. These transfer equations simplify greatly when the gas is assumed to be very lightly ionized and are reduced to the equations of a single-fluid-with-conduction model. Secondly, the equations for a three-fluid model are derived. In this model the properties of each species are defined in terms of its own motion, and not in terms of the total mass motion as in the one-fluid model. This model provides a useful physical interpretation of Joule heating effects. (Author)

AD-428 819 Div. 9, 1
OTS price $3.60

Vidya, Inc., Palo Alto, Calif.
THEORETICAL STABILITY DERIVATIVES FOR A DUCTED PROPELLER.
Interim rept.,
by A. R. Kriebel. 18 Oct 63, 1v.
Contract NOw62 0129c, Proj. 9063
Unclassified report

Descriptors: (*Shrouded propellers, Theory), Thrust, Vertical take-off planes, Hovering, Axially symmetric flow, Ring wings, Aerodynamic loading, Stability, Angle of attack, Pitch (Motion), Mathematical prediction, Propellers (Aerial).

Static force and moment coefficients at angle of attack and their dynamic pitching derivatives are given for an isolated ducted propeller. These result from a potential flow analysis which is based upon Fourier expansion of the vorticity distribution. The analysis offers a valid technique for combining existing theory for ring wings at angle of attack and ducted propellers in axial flow. The propeller is represented as a uniformly loaded actuator disk and the effects of duct chord-to-diameter ratio, circular arc camber, taper, and thickness are shown for the duct coefficients and their pitching derivatives. The predicted thrust ratio of duct to disk for hovering flight is only slightly less than the asymptotic value of unity for thin cylindrical ducts with chord-to-diameter ratio greater than one half. For either hovering or axial flight, the duct thrust, the thrust ratio, and the propulsive efficiency all increase with duct chord-to-diameter ratio, with outward taper downstream, with inward circular arc camber, and also with duct profile thickness if the actuator disk is located in the most favorable position in the duct where the internal cross-sectional area is minimum. (Author)

AD-428 847 Div. 9, 25
OTS price $4.60

David Taylor Model Basin, Washington, D. C.
SURVEY OF THERMAL, RADIATION, AND VISCOUS DAMPING OF PULSATING AIR BUBBLES IN WATER,
by Charles Devin, Jr. Aug 59, 37p.
Proj. NS715 102
DTMB 1329 Unclassified report

Master's thesis.

Descriptors: (*Bubbles, Damping), Air, Water, Theory, Differential equations, Equations, Motion, Vibration, Thermodynamics, Sound, Energy, Temperature, Specific heat, Pressure, Sound transmission, Viscosity, Oscillations, Resonance, Absorption, Acoustic properties.

A theoretical discussion of thermal, radiation, and viscous damping for resonant air bubbles in water is presented. An error in the derivation by Pfriem for the thermal damping constant is corrected. The experimetal results verify that the damping constant at resonance is the sum of the thermal and radiation damping, and possibly viscous damping. (Author)

AD-428 903 Div. 9, 25
OTS price $3.60

Aerospace Corp., El Segundo, Calif.
BOUNDARY LAYER FLOW OF DISSOCIATED GAS WITH ARBITRARY DISTRIBUTION OF SURFACE CATALYCITY,
by S. W. Liu and P. M. Chung. 21 Dec 63, 24p.
Rept. no. TDR269 4230 40 4
Contract AF04 695 269
SSD TDR63 345 Unclassified report

Descriptors: (*Boundary layer, Dissociation), (*Gas flow, Surface properties), Heat transfer, Recombination reactions, Integral equations, Flat plate models, Catalysts, Gases, Dissociation, Frozen equilibrium flow, Surface active substances, Atoms, Diffusion.

The effect of arbitrarily distributed surface chemical activity on heat transfer has been studied and equations describing the diffusion rate of atoms to a surface in contact with a frozen boundary layer have been developed. A Volterra integral equation, is used and it can be solved either by a series method or by a numerical scheme. A detailed development was presented for surface catalytic recombination of atomic species of a disociated diatomic gas flowing over a flat plate. Two basic cases were included: the surface on the front portion as (1) a perfect catalyst or (2) a total noncatalyst. In the examples presented only the non-catalyst case is shown, since this was the only case for which all the methods of solution developed could be readily compared. (Author)

AD-428 910 Div. 9
OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BASIC PROBLEMS OF THE THEORY OF LAMINAR FLOWS,
by S. M. Targ. 9 Jan 64, 67p.
FTD TT63 817 Unclassified report

Trans. from Osnovnyye Zadachi Teorii Laminarnykh Techeniy, Gosudarstvennoye Izdatel'stvo Tekhniko-Teoreticheskoy Literatury, pp. 3-6 and 268-313, 1951.

Descriptors: (*Laminar flow, Diffusers), Fluid flow, Viscosity, Fluid mechanics, Motion, Equations, Velocity, Boundary layer, Conical nozzles, Duct inlets, Pressure, Mathematical models.

A theoretical consideration of the flow of a viscous fluid in diffusers treats the following: (1) Steady Flow of a Viscous Fluid in Plane and Conical Diffusers; (2) Development of a Viscous Fluid Flow in the Plane Diffuser; and (3) Development of a Viscous Fluid Flow in a Conical Diffuser.

AD-428 916 Div. 9, 30
OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
COMPARISON OF HOTSHOT TUNNEL FORCE, PRESSURE HEAT-TRANSFER AND SHOCK SHAPE DATA WITH SHOCK TUNNEL DATA,
by E. E. Edenfield. Jan 64, 25p.
Contract AF40 600 1000, Proj. VT2402
AEDC TDR64 1 Unclassified report

Descriptors: (*Shock tubes, Aerodynamic characteristics), (*Conical bodies, Aerodynamic characteristics), (*Hypersonic wind tunnels, Aerodynamic characteristics), Blunt bodies, Wind tunnel models, Model tests, Pressure, Heat transfer, Shock waves, Slender bodies, Test equipment, Pitch (Motion), Moments, Lift, Drag, Experimental data, Enthalpy, Experimental data.

Comparison is made of force, pressure, heat-transfer, and shock shape data from tests in the AEDC-VKF hotshot tunnels and in the Cornell Aeronautical Laboratory 48 Inch Shock Tunnel. Several cone models of varying bluntness were tested through an angle-of-attack range of 0 to 40 deg at each facility. Excellent agreement of the hotshot and the shock tunnel data is shown. (Author)

AD-428 977 Div. 9, 25
OTS price $1.10

Innsbruck U. (Austria).
APPROXIMATIVE SOLUTION OF THE MAGNETOHYDRODYNAMIC EQUATIONS FOR FINITE CONDUCTIVITY,
by F. Cap and G. Kerer. 25 July 63, 3p. Technical note no. 4
Contract AF61 052 675
Unclassified report

Descriptors: (*Magnetohydrodynamics, Equations), Electrical conductance, Gases, Dynamics, Gas flow, Fluid flow, Perturbation theory, Plasma physics, Gravity, Friction, Thermal conductivity, Entropy, Motion, Thermodynamics, Plasma medium.

Proceeding from the basic equations for steady two-dimensional potential flow, the basic magnetogasdynamical equations are linearized by means of perturbation calculations disregarding gravity, friction and thermal conduction. (Author)

AD-429 077 Div. 9, 30
OTS price $11.00

Martin Co., Aerosciences Research Lab., Orlando, Fla.
TWO DIMENSIONAL ANALYSIS OF TRANSIENT HEAT CONDUCTION IN A SECTOR OF A HOLLOW CIRCULAR CYLINDER.
Final rept., Jan-Aug 63,
by J. G. Torian and G. K. Bennett. Nov 63, 127p.
Rept. no. OR3351
Contract AF33 657 10315, Proj. 1467, Task 146702
ASD TDR63 642 Unclassified report

Descriptors: (*Thermal conductivity, Differential equations), Cylindrical bodies, Transient, Surface temperatures, Mathematical analysis, Boundary valve problems, Heat transfer, Programming (Computers), Data processing systems.

An exact mathematical formulation was sought of transient heat conduction to reduce the amount of idealization required by currently employed finite difference techniques. A two-dimensional analysis is developed beginning with the differential equations for conduction of heat in a segment of a hollow cylinder in polar coordinates. An exact solution with constant thermal diffusivity and conditions of prescribed surface temperature, convection, and direct heat input is written in an infinite series of Bessel and trigonometric functions. Provisions are made for incorporating a coordinate varying, arbitrary, initial temperature distribution as well as coordinate and time varying arbitrary surface conditions. A solution that incorporates the effect of temperature dependent thermophysical properties is developed by combining the exact solution with a finite difference approach. The solution has been programmed for an IBM 7090 or 7094 digital computer. (Author)

AD-429 097 Div. 9
OTS price $1.60

Columbia U. School of Engineering and Applied Sciences, New York.
AN EXPERIMENTAL STUDY OF HEAT TRANSFER AT HIGH TEMPERATURE DIFFERENCES IN TURBULENT AIR FLOW BETWEEN A ROTATING CYLINDER AND A STATIONARY CONCENTRIC OUTER CYLINDER.
Final rept.,
by G. S. Longobardo and H. G. Elrod. Oct 63, 16p.
Contract AF49 638 1001
AFOSR 64 0134 Unclassified report

Descriptors: (*Couette flow, Heat transfer), Turbulence, Interferometers, Vortices, Velocity, Temperature, Cylindrical bodies, Rotation.

Velocity and temperature data were obtained for the annulus between a rotating inner cylinder and a stationary outer cylinder. The data were obtained for air under circumstances such that appreciable variation of the transport properties and density would occur in a turbulent flow. These data make possible a test of current theories for the behavior of turbulent, variable-property flow. (Author)

AD-429 118 Div. 9, 30
OTS price $1.00

Harry Diamond Labs., Washington, D. C.
FLUID AMPLIFICATION. 7. A THREE-STAGE DIGITAL AMPLIFIER,
by Carl J. Campagnuolo. 1 Aug 63, 33p.
Proj. DA1P010501A001; HDL Proj. 31131
HDL TR1106 Unclassified report

Descriptors: (*Fluid flow, Amplifiers), Digital systems, Subsonic flow, Boundary layer, Turbulence, Jets, Turbulent boundary layer, Fluid mechanics, Cascade structures, Diffusers, Noise, Pneumatic systems, Hemispherical shells, Coanda effect, Nozzle gas flow.

The design and performance of a three-stage digital amplifier system obtaining a high-power output and flow gain is described. The design of the system was arrived at by taking measurements of single elements and matching the units with respect to input, output, and feedback performance. Flow gain in the system was obtained by increasing the nozzle widths by a factor of ten from stage to stage. Effects of loading on the stability of intermediate units were controlled by positioning the splitters further downstream than would be required for maximum efficiency. The system was operated with a common power-jet supply pressure of 1 to 15 psig. The system was switched with flow at atmospheric pressure. The third-stage output was exhausted to atmosphere through a 12-deg diffuser. Flow gains up to 3000, pressure recovery of 50 to 67%, and power gains up to about 10,000 were obtained. (Author)

AD-429 172 Div. 9, 25, 6
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SOME ASPECTS OF TURBULENT SCATTERING OF ELECTROMAGNETIC WAVES BY HYPERSONIC WAKE FLOWS,
by K. T. Yen. Dec 63, 35p. Rept. no. R63SD58
Unclassified report

Subcontract to Bell Telephone Labs., Whippany, N. J., Contract DA30 069ORD1955.

Descriptors: (*Reentry vehicles, Wake), (*Wake, Electromagnetic waves), Scattering, Hypersonic flow, Thermodynamics, Turbulence, Ionization, Electron density, Dielectric properties, Refraction, Radar echo areas, Mathematical analysis, Correlation techniques.

This analytical study of the turbulent scattering of electromagnetic waves is directed to certain

features of the phenomenon considered as peculiar to hypersonic wakes. Effects of flow intermittency, non-isotropy of the turbulence structure, and finite width of the wake on the scattering cross section in its frequency and aspect-angle dependence are of primary concern. Phenomena of turbulence relevant to the scattering problem are briefly discussed. In particular, it is shown that electron-density fluctuations of a turbulent nature, in addition to those caused by ''turbulence'', will be produced by the intermittency behavior of turbulent wake flows. This fluctuation is found to depend on the mean electron-density distribution, and Townsend's intermittency function. Phenomenological consideration of the physical process by which the turbulent electron-density fluctuations are likely to be produced in hypersonic wakes yields an expression for the intensity of the fluctuations in terms of the gradient of the mean electron-density distribution, the intensity of the turbulent velocity fluctuation, and a turbulence scale of the turbulent velocity field. Application of the above considerations to turbulent scattering by underdense wakes has been made. (Author)

AD-429 173 Div. 9
OTS price $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
LINEARIZED ANALYSIS OF MHD GENERATOR FLOW STABILITY,
by George W. Sutton and Erik Witalis. Jan 64, 11p. Rept. no. R64SD5
Contract AF49 638 914
Unclassified report

Descriptors: (*Magnetohydrodynamics, Generators), (*Plasma physics, Magnetohydrodynamics), One-dimensional flow, Stability, Electrical conductance, Thermodynamics, Perturbation theory, Density, Pressure, Velocity, Mathematical analysis, Gas flow, Compressible flow.

The quasi one-dimensional compressible flow equations for a magnetohydrodynamic power generator were analyzed for one-dimensional instabilities by means of linearized perturbations. The gas was assumed to be ideally compressible, inviscid, nonheat-conducting, with an electrical conductivity that depends on local temperature. The results indicate that large instabilities cannot exist, confirming the previous approximate results of Wright and refuting the original claims of Velikhov. (Author)

AD-429 174 Div. 9
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
GENERAL RESEARCH ON THE OSCILLATIONS OF A TURBULENT FLOW,
by R. Betchov and W. O. Criminale. 27 Jan 64, 27p. Rept. no. ATN64 9231 1
Unclassified report

Descriptors: (*Turbulent boundary layer, Fluid flow), Motion, Theory, Laminar boundary layer, Viscosity, Turbulence, Stability, Mathematical models, Velocity, Pressure, Oscillation, Functions, Digital computers, Vortices.

A turbulent boundary layer is assimilated to a laminar layer of large and variable viscosity. This viscosity represents the eddy viscosity. A stability analysis is performed for small perturbations by the use of a digital computer. It is found that a typical turbulent layer is stable, even if the eddy viscosity vanishes at the wall. However if the mean velocity profile has a weak inflection near the outer edge, instabilities do occur. Various observations of the intermittent part of the layer suggest the existence of such inflections and lend to acceptable values of the wavelengths and phase velocities. It is also found that the laminar sublayer has a negligible effect on this type of oscillation. (Author)

AD-429 198 Div. 9, 12
OTS price $8.60

Aerospace Corp., Los Angeles, Calif.
ABLATING BODY HEAT TRANSFER,
by J. A. Quinville and J. Solomon. 15 Jan 64, 84p. Rept. no. TDR269 4560 10 1
Contract AF04 695 269
SSD TDR63 159 Unclassified report

Descriptors: (*Reentry vehicles, Aerodynamic heating), (*Blunt bodies, Aerodynamic heating), (*Conical bodies, Aerodynamic heating), Heat transfer, Ablation, Laminar boundary layer, Turbulent boundary layer, Gas flow, Dissociation, Reaction kinetics, Thermal conductivity, Pyrolytic graphite, Heat shields, Cylindrical bodies, Flared afterbodies, Friction, Pressure, Frozen equilibrium flow, Mathematical analysis, Mathematical models, Numerical analysis, Digital computers, Nose cones.

A computational technique is described that determines the transient aerodynamic heating and ablation of a vehicle throughout an arbitrary flight trajectory. Both laminar and turbulent boundary layers are treated for flows over blunt or sharp nosed two-dimensional or axisymmetric bodies. The effects of real gas dissociation as well as chemically reacting ablation are considered. The chemical reactions include both diffusion limited and rate limited combustion of carbon. The transient heat conduction model treats the one-dimensional flow of heat into a material which may be of the char-forming type with internal depolymerization. The computational technique has been coded in Fortran for an IBM 7090. The numerical solutions for an ablating char forming material using the complete boundary layer and heat conduction programs are considered satisfactory. However, the IBM 7090 execution time was longer than desired. The combined programs can be improved from the present conditions in several areas leading to shorter computational times. (Author)

AD-429 309 Div. 9
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STUDY OF HYPERSONIC CONTAMINATED WAKE BY AN EXACT NUMERICAL SOLUTION,
by Huon Li. Dec 63, 30p. Rept. no. R63SD68
Unclassified report

Subcontract to Bell Telephone Labs., Whippany, N. J. Contract DA30 0690RD1955.

Descriptors: (*Wake, Sodium). (*Slender bodies, Wake). (*Atmosphere entry, Optical phenomena). Numerical methods and procedures, Air, Electron density, Hypersonic flow, Equations, Gas ionization, Turbulence, Contamination.

A theoretical study is presented of hypersonic wake with and without contaminants. The nonlinear coupling equations of gas dynamics and

chemical kinetics are solved numerically by a finite-difference scheme. Typical calculations of laminar and turbulent non-equilibrium wake are shown for a slender body with square root of (C sub D) (A) approximately equal to 10 cm. The results indicate that the air system and the air-plus-sodium system are in non-equilibrium at the altitude of 100,000 ft. This non-equilibrium characteristic may exist at even lower altitudes. The effects of sodium on the electron concentration are important. Since the deionization processes of sodium are relatively slow, the sodium-contaminated wake has a longer electron trail. (Author)

10. FUELS AND COMBUSTION

AD-428 046 Div. 10, 12
OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL ANALYSIS FOR THE MECHANICAL SPALLATION OF A TYPICAL CHARRING ABLATOR DURING RE-ENTRY,
by R. D. Mathieu. Dec 63, 1v. Rept. no. R63SD53
Contract AF04 694 222
Unclassified report

Descriptors: (*Ablation, Spallation), (*Spallation, Ablation), (*Reentry vehicles, Ablation), Gas flow, Pyrolysis, Thermal insulation, Porosity, Stresses, Degradation, Differential equations, Integral equations, Surface properties.

Results are presented for the transient ablation performance of a typical charring ablator for which spallation is responsible for the char removal. The mechanism for the spallation process depends upon the internal stress due to the gas pressure drop through the char and a critical char thickness which is related to the surface shear stress. The environmental conditions considered are representative of a ballistic re-entry trajectory. Detailed calculations of the temperature, gas pressure, material density, porosity, and stress distribution through the material are presented. The effect of the char porosity on the internal stress is shown. In addition, results which demonstrate the effects of increased heating on the char removal and overall ablation performance are presented. (Author)

AD-428 270 Div. 10, 27
OTS price $4.60

Aerojet-General Corp., Sacramento, Calif.
ANALYSIS OF PROPELLANT IGNITION, AND ITS APPLICATION TO MOTOR INITIATION,
by R. L. Lovine, L. Y. Fong, and B. E. Paul.
4 Nov 63, 37p. TM235 SRP
Unclassified report

Descriptors: (*Solid rocket propellants, Ignition), (*Rocket motors (Solid propellant), Ignition), (*Rocket igniters, Energy), Second stage motors, Ignition systems, Mathematical prediction, Reliability, Heat transfer, Diffusion, Mass-energy relation, Experimental data, Reaction kinetics, Thermal conductivity, Equations, Guided missiles (Surface to surface), Model tests.

A model of solid propellant ignition is given in order to relate igniter energy output to motor ignition. Difficulties inherent in the nonlinear partial differential equations of heat and mass diffusion describing the ignition system prevent the model from being completely analytical. However, certain results are derived from the equations, and when combined with arc-image furnace ignitability data, a reasonably coherent view of the process is obtained. Numerous examples of ignitability data are given. Analysis of heat and mass transfer from igniter to motor grain is given for the case of propellant-type igniter. This analysis, along with the pertinent ignitability data, is applied to ignition of the 2nd stage Minuteman motor. (Author)

AD-428 545 Div. 10, 25
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INFLAMMATION OF METHANE MIXTURES IN SHOCK WAVES,
by A. A. Borisov, S. M. Kogarko and A. V. Lyubimov. 23 Sep 63, 7p.
FTD MT63 101 Unclassified report

Trans. from Doklady Akademii Nauk SSSR, 149:4, pp. 869-871, 1963.

Descriptors: (*Hydrocarbons, Combustion), (*Shock waves, Hydrocarbons), (*Combustion, Hydrocarbons), Gases, Pressure, Mixtures, Oxygen, Air, Argon, Oxidation, Decomposition.

AD-428 602 Div. 10
OTS price $16.00

Princeton U., N. J.
SOLID PROPELLANT IGNITION STUDIES: IGNITION OF THE REACTION FIELD ADJACENT TO THE SURFACE OF A SOLID PROPELLANT.
Final technical rept., 1 Oct 62-30 Sep 63,
by Clarke E. Hermance, Reuel Shinnar and Joseph Wenograd. 1 Dec 63, 108p. Rept. no. AE674
Grant AF AFOSR92 63
Unclassified report

Descriptors: (*Ignition, Rocket motors), (*Solid rocket propellants, Ignition), (*Rocket motors (Solid propellants), Ignition), Flames, Surfaces, Boundary layer, Gaseous rocket propellants, Liquid rocket fuels, Subsonic flow, Supersonic flow, Mathematical models, Integral equations, Partial differential equations, Programming (Computers), Shock tubes, Supersonic nozzles, Rocket motor nozzles.

The object of this research was to elucidate ignition mechanisms of solid propellants, to identify the component processes, and to lay the basis for a theory of ignition. Experiments were performed in which composite propellant samples and polymeric fuel samples were exposed to high and low speed flows of oxygen containing gases at high temperature and pressure in a shock tunnel. Ignition of either propellant or fuel could not be obtained in high speed flows even in pure oxygen; in addition, no charring or decomposition of the fuel was observed. At low flow speeds, on the other hand, ignition of the composite propellant and the polymeric fuel did occur, and the ignition delay was found to depend on the gas phase oxygen concentration. The non-ignition at high flow speeds indicated that dilution or sweeping away of the gaseous reaction zone inhibited the ignition. Results strongly suggest that the site of ignition is in a gaseous reaction boundary layer adjacent to the surface of the propellant and not on the fuel surface itself. (Author)

AD-428 866 Div. 10, 16
OTS price $2.75

General Dynamics, Fort Worth, Tex.
MECHANICAL TECHNIQUES FOR KILLING, REMOVING, OR CONTROLLING MICROORGANISMS IN HYDROCARBON FUELS.
Rept. for 1 July 62-Aug 63,
by H. P. Owen, M. T. Carroll, H. G. Hedrick, T. W. Albrecht and D. J. Pritchard. Dec 63, 135p.
Contract AF33 657 9181, Proj. 8169, Task 816905
ASD TDR63 242 Unclassified report

Descriptors: (*Jet engine fuels, Contamination), (*Microorganisms, Hydrocarbons), (*Fuel contamination, Microorganisms), Decontamination, Countermeasures, Separation, Control,

Purification, Electromagnetic waves, Microwaves, Radiofrequency, Ultraviolet radiation, X-rays, Ultrasonic radiation, Electricity, Alpha bombardment, Beta particles, Gamma rays, High pressure research, Reduction, Centrifuge separation, Electrostatic precipitation, Filters,(Fluid), Ion exchange resins, Test equipment, Test methods, Bacteria, Fungi, Fuel tanks, Electric currents, Decompression, Degradation, Fuel seals.

Effort was made to examine all known mechanical techniques for killing, removing, or controlling microorganisms found in hydrocarbon fuels. The microorganisms of interest included bacteria and fungi which are known to live in water, in a water-fuel interface, and within the hydrocarbon fuel. A group of 20 microorganisms, representative of those found in aircraft fuel tanks and fuel storage tanks, were selected for use in the various experiments. A complete evaluation was made on the utilization of radio frequency (RF) irradiation and ultrafine mechanical filters. The sterility of treated fuel samples was established, the effect of each technique on the fuel and fuel additive properties determined, and the effect of the treated fuel on fuel tank sealants and O-rings investigated. (Author)

AD-429 088 Div. 10, 1
OTS price $1.10

Lockheed Propulsion Co., Redlands, Calif.
SOLID PROPELLANT STRUCTURAL INTEGRITY INVESTIGATIONS. DYNAMIC RESPONSE AND FAILURE MECHANISMS.
Program status rept. no. 11, 21 Nov-20 Dec 63. 8 Jan 64, 13p. Rept. no. 618P11
Contract AF04 611 8539
Unclassified report

Descriptors: (*Solid rocket propellants, Failure (Mechanics)), Viscoelasticity, Shear stresses, Tensile properties, Microstructure, Dielectric properties, Rupture, Aging (Materials), Binders, Particle size.

Program effort is concentrated on the study of propellant dynamic physical properties and structural failure phenomena. Activities of the current report period are summarized below. A cyclic heat rise test with constant amplitude shear strain excitation and isothermal boundary conditions was completed. Stress relaxation characterization was completed for the Polycarbutene-T cross-link density formulation variations. Significant variations in relaxation response were observed for these propellants. Electrical investigation of Nitroplastisol propellant and ingredients is in progress. These materials have been found to be much more electrically active than the polybutadiene base propellants. Selected formulation variations are being recast for investigation of the effect of these variations on failure under multiaxial stress fields. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-428 951 Div. 11, 30
OTS price $8.10

Bell Aerosystems Co., Buffalo, N. Y.
STUDY OF FLEXIBLE JET EXTENSIONS FOR GROUND EFFECT MACHINES - PHASE II,
Nov 63, 81p. Rept. no. 2131 920002
Contract Nonr4175 00
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Ground effect machines, Extendable structures), Test facilities, Models (Simulations), Bonding, Wear resistance, Model tests, Glass textiles, Synthetic rubber, Terrain, Equations.

The results of a test program on flexible jet extensions, or trunks, for Ground Effect Machines are presented. Current state-of-the-art in the use of trunks is discussed, and the effect of trunks on SKMR-1 is outlined. A whirling arm test rig facility was used to test model trunks under conditions simulating those of a full scale machine. The facility consisted of a self-powered whirling arm of 20-foot radius to which was attached a 4-foot diameter working GEM model. The Annular jet GEM model designed and constructed under this contract provided for attachment of a full set of circular trunks of 6 in. height. Several obstacles, designed to produce effects on the trunks simulating full scale obstacles, were placed on the test track. Two sets of trunks of identical design but different materials were tested to destruction. Material differences were noted and design improvements suggested. Future use of this facility should provide valuable design information and useful material evaluation. (Author)

AD-429 005 Div. 11
OTS price $11.50

GM Defense Research Labs., Santa Barbara, Calif.
EVALUATION OF ELASTIC-FRAME VEHICLE CONCEPT.
Final rept.,
by Frederick Jindra. Nov 63, 1v. Rept. no. TR63 244
Contract DA04 495AMC132
Unclassified report

Descriptors: (*Vehicles, Vehicle chassis components), (*Vehicle chassis components, Elasticity), Model tests, Performance (Engineering), Water, Soils, Velocity, Mobile, Power, Instrumentation, Towed vehicles, Stresses, Vibration.

A comprehensive test program was conducted with the objective of establishing design and performance parameters for an articulated, elastic-frame, wheeled vehicle concept. Exploratory tests were performed in the laboratory with a powered, 1/4-scale model to obtain information on mobility and obstacle crossing; and tests in the field with an unpowered, towed, full-size test rig to investigate maneuverability, directional stability, stresses in the elastic frame, and ride and vibration characteristics. From these results, recommendations are made for the design of a powered, elastic-frame, vehicle test rig. (Author)

12. GUIDED MISSILES

AD-427 965 Div. 12, 32
OTS price $18.00

Boeing Co., Seattle, Wash.
WS-133B MASTER TECHNICAL DATA INDEX,
by W. N. Watson. 18 July 63, 285p. Doc. no. D2 30032 1A, rev. B
Contract AF04 694 266
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Documentation), Indexes, Military requirements, Specifications.

Revisions to an index of deliverable documents are presented as a component of the MINUTEMAN master document indexes. (Author)

AD-427 966 Div. 12
OTS price $16.00

Boeing Co., Seattle, Wash.
WS-133B MASTER TECHNICAL DATA INDEX,
by W. N. Watson. 16 Jan 64, 242p. Doc. no. D2 30032 1B
Contract AF04 694 266
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Documentation, Indexes, Specifications, Military requirements, Air force operations, Reports, Handbook, Guided missiles components, Data.

Information is presented on all Air Force required documents on the WS-133B Program, Contracts AF04 694 266, AF04 694 362, AF04 694 431, and AF04 694 451. Every document prepared by The Boeing Company in support of the WS-133B contracts is described in the Master Index. The index identifies the information prepared to justify document preparation and it serves as a source of abstracts for those documents. (Author)

AD-428 002 Div. 12
OTS price $13.50

RCA Defense Electronic Products, Moorestown, N. J.
ELECTRO-OPTICAL ATTITUDE MEASURING SYSTEM.
A DESIGN STUDY.
Oct 63, 1v.
Contract AF19 628 2900
ESD TDR63 624 Unclassified report

Descriptors: (*Optical scanning, Lasers), (*Attitude indicators, Guided missiles), Optical equipment, Data processing systems, Design, Radio astronomy, Ranges (Distance), Errors, Reliability, Photomultipliers, Polarization, Interference, Detection, Light, Quartz, Electromagnetic pumps, Reflection, Transmitters-receivers, Electric trigger control, Pitch (Motion), Yaw, Roll, Beams (Electromagnetic), Calibration, Mathematical analysis, Gain, Performance (Engineering), Reflectors.

A design study is presented to investigate a method of electro-optically determining the attitude of a missile from lift-off to 50,000 feet. The attitude in terms of pitch, yaw, and roll is obtained from a single station by lasers illuminating two missile borne retroreflector packages. Each retroreflector package has as one of its components a Savart plate. The reflected radiation is returned to the receivers where the beams are separated and analyzed by a polarization sensitive system to determine polarization states induced at the Savart plates as the missile's attitude changes. (Author)

AD-428 045 Div. 12, 26
OTS price $1.10

White Sands Missile Range, N. Mex.
GUIDELINES FOR THE DEVELOPMENT OF MISSILE FLIGHT SAFETY SYSTEMS.
Oct 63, 5p.
WSMR 302 63 Unclassified report

Descriptors: (*Guided missile safety, Management engineering), Guided missile ranges, Destructors, Analysis, Guided missile trajectories.

Guidelines are presented which will help decide the need for a safety system. The guidelines will be related to missile performance and test area conditions. Various mathematical methods and engineering considerations are discussed which are needed to meet any safety system requirement. These details will be related to the philosophies and policies that are practiced at the National Missile Ranges (AMR, PMR, WSMR) and will also be applicable to any range (test area), wholly or in part. (Author)

AD-428 098 Div. 12
OTS price $3.60

Boeing Co., Seattle, Wash.
LAUNCH CONTROL SYSTEM ELECTRICAL LOAD ANALYSIS, OPERATIONAL LAUNCH FACILITY,
by W. P. Koenig. 31 Dec 63, 1v. Document no. D2 4853 1
Unclassified report

Descriptors: (*Launching, Control systems), Alternating current, Direct current, Power, Analysis, Corrections, Specifications, Guided missile (Surface to surface).

AD-428 232 Div. 12, 2
OTS price $1.10

Institute for Defense Analyses, Washington, D. C.
ON THE REQUIREMENTS FOR SYNCHRONOUS ORBITS,
by Douglas Duke. Sep 61, 9p.
Contract SD50
IDA TN61 22; UBG 61 228 Unclassified report

Descriptors: (*Synchronous satellites, Equatorial orbit trajectories), Solar systems, Earth, Orbital trajectories, Drag, Weight, Gravity, Velocity, Errors, Injection guidance, Sun, Mathematical analysis, Satellite attitude, High altitude, High orbit trajectories.

This note investigates certain problems associated with orbiting satellites in such a way that they pass over the same point on the earth at the same time each day. It is found that such orbits are possible and can be maintained for several months. It is also possible to choose the orbit so that the satellite spends a negligible fraction of its useful lifetime in the earth's shadow. Because of the specific applications contemplated, only altitudes from 250 to 1000 km are considered. The items of interest are the orbits themselves, their decay times, the injection accuracy required to achieve them, and (because of solar power considerations) the relative durations of shadow and sunlight in each orbit. (Author)

AD-428 305 Div. 12
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
(No title).
Quarterly bibliography of repts., 1 Oct-31 Dec 63, comp. by Barbara H. Peer. 20 Jan 64, 1v. Rept. no. CSR269 9990QBR2
Contract AF04 695 269
Unclassified report

Descriptors: (*Bibliographies, Spacecraft), (*Bibliographies, Guided missiles), (*Spacecraft, Bibliographies), (*Guided missiles, Bibliographies), Launch vehicles (Aerospace), Research program administration, Air Force research.

The bibliography is sectionalized in four categories: contract status reports; technical operating reports; technical documentary reports; and other reports. (Author)

AD-428 311 Div. 12, 5
OTS price $13.50

ITT Communication Systems, Inc., Paramus, N. J.
PARAMETRIC ANALYSIS OF MEDIUM-ALTITUDE ACTIVE AND PASSIVE COMMUNICATION SATELLITES.
20 Sep 63, 1v. Rept. no. ICS63TR250
Contract AF19 626 5, Task 37
ESD TDR63 677 Unclassified report

Descriptors: (*Communication satellites (Active), Military satellites), (*Communication satellites (Passive), Military satellites), (*Satellite networks, Global communication systems), Research program administration, Operations research, Feasibility studies, Models (Simulations), Costs, Launching sites, Launch vehicles (Aerospace), Ground support equipment, Weight, Orbital trajectories, Multiple operation, Launching, Circular error probable, Digital computers, Optimization.

An investigation was made of the broad systems aspects of medium altitude active and passive satellites for possible use in a military communication network. The two types of satellite systems are compared primarily on an economic basis, with randomly spaced, medium-altitude orbits assumed. A specific, ten-station, globe-encircling network is used to study the trunkline communications which would be available between main military bases at various locations. A set of system requirements is defined in order to provide a basis for comparison. In performing the analysis, emphasis is placed on system considerations. The comparison is carried out in the form of a parametric analysis. Active and passive satellite models, representative of current state of the art, are defined; and simple mathematical models provide weight and cost variations for the models as a function of satellite capabilities. Satellite performance, orbital altitude and inclination angle are allowed to vary. On the basis of cost and orbital payload capability of two specific launch vehicles, orbital subsystem costs are determined. (Author)

AD-428 420 Div. 12
OTS price $14.75

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-121-3-1-5, AND QUALIFICATION SUPPLEMENT I THEREOF, ELEVATOR-WORK CAGE, PASSENGER AND EQUIPMENT,
by C. L. Gunderson. 3 May 63, 291p. Document no. D2 9490 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Silos), (*Elevators, Silos), Hoists, Guided missile personnel, Tests, Test facilities, Structures, Supports, Performance (Engineering), Visual inspection, Experimental data, Noise (Radio), Broadband, Electrical equipment, Frequency, Electrical impedance, Test methods.

Presented are the qualification test reports for the Elevator-Work Cage, Passenger and Equipment, Type GSU-100/E for the Minuteman silo. Also included is the certification of full compliance with the qualification requirements of the foresaid supplement. (Author)

AD-428 490 Div. 12
OTS price $18.00

Boeing Co., Seattle, Wash.
WING II TEST OPERATIONS PLAN (FTM 695),
by Bobby R. Thompson. 16 July 63, 1v. Doc. no. D2 15307 4
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Test methods), Operations research, Tests, Research program administration, Scheduling, Data, Roll, Maintenance, Operation, Checkout procedures, Visual inspection, Launching, Tables.

The gross flow and milestone schedule of the maintenance and operation functions that will be accomplished from receipt through launch of the Minuteman missile is presented. (Author)

AD-428 568 Div. 12
OTS price $6.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ANALOGUE SIMULATION OF THE DYNAMIC EQUATIONS OF ATMOSPHERIC BALLISTIC RE-ENTRY,
by Paul M. Beckham and Henry F. Tisdale.
Jan 64, 54p.
Contract AF40 600 1000
AEDC TDR63 257 Unclassified report

Descriptors: (*Descent trajectories, Simulation), (*Atmosphere entry, Simulation), Analog systems, Analog computers, Equations, Velocity, Angle of attack, Motion, Acceleration, Nose cones, Reentry vehicles, Programming (Computers).

Equations of re-entry, previously solved almost exclusively by digital computing equipment, are adapted to the analogue computer. Procedures are describes to make the dynamic equations of ballistic re-entry compatible to analogue simulation techniques. Considering four sets of initial conditions, the equations are solved on an EAI PACE 231R analogue computer and an IBM 7074 digital computer and the results compared. (Author)

AD-428 573 Div. 12, 30
OTS price $3.60

North American Aviation, Inc., Downey, Calif.
SPACE VEHICLE THERMAL AND ATMOSPHERIC CONTROL RESEARCH PROGRAM,
by R. E. Sexton. 1962, 29p.
Contract AF33 616 8953
Unclassified report

Descriptors: (*Spacecraft, Controlled atmospheres), Closed cycle ecological systems,

Temperature control, Research program administration, Thermal radiation, Heat transfer, Theory, Carbon dioxide, Reduction, Absorption, Oxygen, Regeneration, Spacecraft cabins, Space flight, Space environmental conditions.

The space vehicle thermal and atmospheric control research program is described that is being conducted by the Space and Information Systems Division of North American Aviation, Inc. This is a three-year program directed toward development of technology that will provide solutions for the environmental control problems of future space missions. (Author)

AD-428 688 Div. 12
OTS price $1.60

26th Air Div. (SAGE), Hancock Field, Syracuse, N. Y.
AIDS FOR IMPROVING BOMARC TACTICAL EVALUATIONS,
by Myron C. Lawrence. 1 Dec 63, 14p.
26ADS OAWP 11 Unclassified report

Descriptors: (*Guided missiles (Surface-to-air), Quality control), Failure (Mechanics), Malfunctions, Sequential analysis, Statistical tests, Statistical analysis, Sampling, Probability.

Research is presented which provides for the application of statistical techniques to the problem of estimating the percent of operable missiles in a squadron of any size via sampling. Data presented are representative of those techniques which should be employed in estimating a BOMARC squadron's operational capability where such estimates are required to contain a high degree of accuracy. A complete family of sampling plans incorporating those techniques are, or could be made, readily available for any squadron size, sample size and degree of accuracy required. (Author)

AD-428 743 Div. 12
OTS price $4.60

Mitre Corp., Bedford, Mass.
A CRITICAL SURVEY OF IN-ORBIT GUIDANCE AND CONTROL PROBLEMS AND A FUNCTIONAL ANALYSIS OF A MASTER CONTROL CENTER,
by K. K. Maitra and G. A. Bakalyar. Dec 63, 43p. Rept. no. W6374
Contract AF19 628 2390, Proj. 600 1
ESD TDR63 482 Unclassified report

Descriptors: (*Spacecraft, Attitude control systems), Transfer trajectories, Rendezvous trajectories, Calculus of variations, Thrust, Rendezvous guidance, Orbital trajectories, Guidance, Gravity.

Research is concerned with the in-orbit guidance and attitude control of space vehicles. The typical problems, namely orbital transfer, rendezvous, interception, orbit sustaining, attitude control and corrective guidance, are discussed in a qualitative fashion. The significance of mass and/or time-optimized guidance subject to important considerations, such as boundedness of thrust magnitude, attitude and phase constraints, is emphasized. Precise mathematical formulations within the frameworks of the variational calculus followed by a brief critical survey of the available optimization techniques relevant to the above problems are also contained herein. The state of the art and the available unclassified results are briefly reviewed. An analysis of the functional requirements of a control center relevant to in orbit guidance is included. (Author)

AD-428 769 Div. 12
OTS price $2.60

Boeing Co., Seattle, Wash.
TEST PLAN FOR MODIFIED TRANSPORTER-ERECTOR AND ASSOCIATED EQUIPMENT,
by R. V. Glase. 14 Jan 64, 23p. Document no. D2 15691 1
Contract AF04 694 107
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Transporter-erectors), (*Transporter-erectors, Guided missiles (Surface-to-surface)), Test methods, Military requirements, Research program administration, Hoists, Modification kits.

Details are presented of the subsystem test plan for Verification Qualification and Evaluation testing associated with the Transporter-Erector Modification Program. This test plan provides a comprehensive test program of both Boeing and Vendor testing selected to demonstrate achievement of the overall modification program objectives. The testing is listed with a discussion of how each test demonstrates achievement of the modification objectives or verifies compliance with the design requirements. Also included is a description of the documentation and support effort involved in the fulfillment of the test program. (Author)

AD-428 812 Div. 12
OTS price $1.60

Mitre Corp., Bedford, Mass.
POSITION AND VELOCITY ERRORS RESULTING FROM IMPERFECT ESTIMATION OF NEARLY CIRCULAR SATELLITE ORBITS,
by R. Manasse. Jan 64, 9p. Rept. no. W6637
Contract AF19 628 2390, Proj. 602 0
ESD TDR64 77 Unclassified report

Descriptors: (*Circular orbit trajectories, Errors), (*Satellites (Artificial), Circular orbit trajectories), Determinations, Position finding, Velocity, Mathematical prediction, Motion, Equations.

An error analysis is presented for the problem of prediction of position and velocity of a satellite with a nearly circular orbit from initial measurements of position and velocity. Relatively simple expressions are obtained for these errors which should prove useful both for obtaining numerical results and for the physical interpretation of the effect of errors on prediction. The error formulas are in agreement with results obtained earlier by Schweppe using a more general method of analysis. (Author)

AD-428 859 Div. 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
PRELIMINARY INVESTIGATIONS RELATIVE TO MULTIPLE RENDEZVOUS BETWEEN CIRCULAR ORBITS,
by H. L. Roth. 15 Jan 64, 31p. Rept. no. TDR269 4130 10 4
Contract AF04 695 269
SSD TDR63 179 Unclassified report

Descriptors: (*Circular orbit trajectories, Rendezvous trajectories), (*Transfer trajectories, Circular orbit trajectories), (*Rendezvous spacecraft, Transfer trajectories), Nomographs, Energy management, Elliptical orbit trajectories.

Combination of a series of Hohmann transfers is considered as a means of accomplishing multiple

in-plane rendezvous. It is shown that, for the in-plane case, the velocity penalty associated with visiting additional circular orbits is small compared to the cost of passing from the inner to the outermost orbit. It is furthermore shown that the velocity expenditure for in-plane rendezvous is less than the difference between the circular orbit velocity of the bounding orbits, regardless of the number of orbits visited (starting at one bounding orbit and proceeding in the most economical manner). Some consideration is also given to the problem of multiple three-dimensional rendezvous. Prime consideration is devoted to the use of a modified Hohmann transfer with a simple plane change at the outer orbital altitude. The modified Hohmann technique is compared to the bi-elliptic transfer with plane change for certain chosen phasing angles. (Author)

AD-428 902 Div. 12
OTS price $3.60

Aerospace Corp., El Segundo, Calif.
A STEEPEST-ASCENT SOLUTION OF MULTIPLE-ARC. VEHICLE OPTIMIZATION PROBLEMS,
by R. G. Graham. 19 Dec 63, 27p. Rept. no. TDR269 4550 20 3
Contract AF04 695 269
SSD TDR63 362 Unclassified report

Descriptors: (*Boost-glide vehicles, Trajectories), (*Trajectories, Optimization), Lunar trajectories, Rendezvous trajectories, Aerospace craft, Angle of attack, Differential equations, Integrals, Thrust, Equations, Motion, Intercept trajectories, Numerical methods and procedures, Inequalities, Thrust reverse, Ascent trajectories, Descent trajectories.

A steepest-ascent method for the simultaneous optimization of time dependent functions and time invariant quantities is developed. The method is based on the definition of a step size which combines the integral step associated with the time functions and the sum of squares step associated with the time invariant quantities. The particular case of interest is the optimization of multiple-arc-problems with the associated corner times. Using the properties of the adjoint system, a relationship describing the effects of small changes in the corner times is developed; and the generalized steepest-ascent method is applied to determine the optimum corner times and steering functions. Numerical examples are given to demonstrate the efficacy of the technique. (Author)

AD-428 969 Div. 12, 27
OTS price $7.60

Aerojet-General Corp., Sacramento, Calif.
WEAPON SYSTEM 107A-2. PRODUCT ENGINEERING PROGRAM. SECOND QUARTERLY REVIEW OF COATED METALLIC THRUST CHAMBERS, EXPANDABLE NOZZLES, COMBUSTION INSTABILITY SCALING CONCEPTS AND ABLATIVE THRUST CHAMBERS.
17 Jan 64, 1v.
Contract AF04 694 212
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Rocket components), (*Combustion chambers, Thermal insulation), (*Rocket motor nozzles, Design), (*Combustion, Stability), (*Combustion chamber liners, Ablation), Regenerative cooling (Rockets), Film cooling, Refractory materials, Plastics, Composite materials, Rocket research, Coatings, Screaming combustion, Fuel injectors, Captive tests, Air force.

AD-428 986 Div. 12, 30, 7
OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
NON-CONDUCTIVE MONITORING OF MISSILE COMPONENTS AND SYSTEMS,
by R. H. Blair. 15 Oct 63, 13p.
NOL TR63 229 Unclassified report

Descriptors: (*Guided missile components, Checkout procedures), (*Fiber optics, Checkout procedures), (*Guided missile warheads, Checkout procedures), Monitors, Reliability, Test methods, Non-destructive testing, Electrical properties, Malfunctions, Modification kits, Models (Simulations), Simulation, Attachment.

Both the reliability and safety of an adaption kit/warhead system could be increased if non-electrical monitoring were used. To overcome the disadvantages of electrical monitoring, a new system was designed using fiber optics, or the transmission of light by flexible-glass pipes. No electrical current is used for this monitor system. Induced light is transmitted from component to component, indicating component or subcomponent condition and/or presence. Fiber optics has a further advantage in its adaptability for separating reliability and safety features monitored. Poorly mated or unmated connections will interrupt the light path, thus indicating questionable system reliability. The condition of the components can be monitored by passing a light beam through a prearranged screen or port within each device. A system using this non-conductive method of monitoring requires no special test equipment; only a light source is necessary. (Author)

AD-429 015 Div. 12, 30
OTS price $5.60

General Dynamics/Astronautics, San Diego, Calif.
SPACE LAUNCH VEHICLE FULL-SCALE DAMPING TESTS,
by J. G. Miller. 21 June 63, 1v. Rept. no. GDA63 0376
Contract AF04 694 185
Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Damping), (*Guided missiles (Surface-to-surface), Wind), Reduction, Oscillation, Deformation, configuration, Friction, Test methods, Excitation, Instrumentation, Calibration, Moments, Propellant tanks, Payload, Transducers, Guided missile safety, Sloshing, Liquid rocket propellant.

The wind study portion of testing showed that the SLV gantry tower is sufficiently stable to be used as a base for forced oscillation of the vehicle and that any measurement of relative motion between the vehicle and tower is of vehicle movement only. The structural damping ratio of the first cantilever mode of Atlas Agena 461 and 698 BJ varied between a high of 2.14 percent and a low of 0.57 percent, depending upon the axes and the tanking condition. It was not possible to determine a damping factor for all cases by the methods used because of the internal (liquid) movements, but for many conditions damping factors were determined with good accuracy. In general the theoretical frequencies were verified to an excellent degree. The experimental damping factors agreed reasonably well with the results of previous tests. Increased confidence in the recent SLV ground wind restrictions has been the direct result of this test. (Author)

AD-429 017 Div. 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
ON THE PROBLEM OF OPTIMAL THRUST PROGRAMMING FOR A LUNAR SOFT LANDING,
by J. S. Meditch. 15 Dec 63, 25p. Rept. no. TDR269 4540 20 1
Contract AF04 695 269
SSD TDR63 309 Unclassified report

Descriptors: (*Lunar craft, Landings), (*Soft landings, Energy management), Thrust, Optimization, Fuel consumption, Functions, Time, Equations, Motion.

The problem of minimal fuel thrust programming for the terminal phase of a lunar soft landing mission is shown to be equivalent to the minimal time problem for the mission. The existence of an optimal (minimal fuel) thrust program for the problem is then assured by appealing to existence theorems for time optimal controls, and the optimal thrust program is developed by application of the Pontryagin maximum principle. The optimal thrust program is shown to consist of either full thrust from the initiation of the mission until touchdown, or a period of zero thrust (free-fall) followed by full thrust until touchdown. An approximate switching function which is adequate for a large number of cases is derived, and a preliminary system design is presented. (Author)

AD-429 033 Div. 12
OTS price $8.60

Litton Systems, Inc., Woodland Hills, Calif.
FLIGHT DATA SYSTEM ORBITAL ERROR ANALYSIS.
Engineering rept.,
by L. Cohen and S. P. Holzapfel. Oct 63, 78p.
Rept. no. SMFD2 1
Contract AF33 616 6579
Unclassified report

Descriptors: (*Inertial guidance, Command and control systems), (*Command and control systems, Inertial guidance), Digital computers, Orbital trajectories, Suborbital trajectories, Errors, Mathematical analysis, Trajectories, Accelerometers, Control systems, Injection guidance, Retro rockets, Descent trajectories, Atmosphere entry, Navigation computers, Gravity, Equations, Theory, Satellites (Artificial), Polar orbit trajectories.

This report consists of three system study reports on the Flight Data System; Inertial Computation Requirements, First Order Orbital Error Analysis, and Analysis of Second Order Gravitational Effects. The Inertial Computation Requirement analysis is divided into two sections. The first section, Pseudo-Coordinate System For Orbital Flights describes the inertial requirements for sub-orbital vehicles. The second section, Computation Requirements For The Flight Data System, details the iteration rates and word lengths required of the central digital computer. The First Order Orbital Error Analysis is predicated on a control system consisting of a high speed digital computer and a four-gimballed gyroscopically stabilized inertial platform mounting three orthogonally oriented accelerometers. The analysis begins with sets of RMS values of path knowledge errors and path control errors, each of which is considered typical of end-of-boost errors. Two control plans are considered: Plan I - Injection and retrofire, partial control, and Plan II - Injection and retrofire, full control. The Analysis of Second Order Gravitational Effects investigates the effect of gravitational anomalies, due to oblateness and non-homogenity, upon satellite polar orbits. (Author)

AD-429 035 Div. 12
OTS price $5.60

Litton Systems Inc., Woodland Hills, Calif.
FLIGHT DATA SYSTEM SPECIAL MODE STUDIES.
Engineering rept.,
by G. P. Zemlin and L. Mc Gann. Oct 63, 50p.
Rept. no. SMFD2 2
Contract AF33 616 6579
Unclassified report

Descriptors: (*Command and control systems, Inertial guidance), (*Inertial guidance, Command and control systems), Errors, Analysis, Euler's angles, Gimbals, Equations, Azimuth, Roll, Pitch (Motion), Stabilized platforms, Attitude control systems, Mathematical analysis, Theory.

This report consists of study reports on the Special Mode Operation of the Flight Data System. The analysis of the geometric relationships of the inertial platform gimbal system includes a set of transformations between gimbal angles, vehicle body rates, and vehicle attitude angles to provide a basis for gimbal output error analysis. The steady state response characteristics of the outer roll gimbal, while operating under special mode conditions, is studied in the LN-4 Platform Outer Roll Gimbal Response Analysis. A replacement for the normal signal adaptor in vehicles or for missions requiring special mode operation is described in an analysis of the Mechanization of LN-4 Special Mode Controller. (Author)

AD-429 036 Div. 12
OTS price $3.60

Litton Systems Inc., Woodland Hills, Calif.
FLIGHT DATA SYSTEM TYPICAL SYSTEM COMPUTATIONS,
by C. S. Bridge and G. P. Zemlin. Oct 63, 26p.
Rept. no. SMFD2 4
Contract AF33 616 6579
Unclassified report

Descriptors: (*Inertial guidance, Command and control systems), (*Command and control systems, Inertial guidance), Equations, Geodesics, Celestial mechanics, Vector analysis, Partial differential equations, Stabilized platforms, Energy management, Gravity, Orbital trajectories, N-body problem, Errors, Descent trajectories, Theory, Landings, Navigation computers, Control systems, Mathematical analysis, Atmospheric entry.

This report presents a set of typical system equations for the Flight Data System with the exception that the Air Data Computations are excluded. The report discusses the development of inertial and control equations for the Advanced Flight Data System in the following sections: (1) Alignment Phase, (2) Inertial Equations, (3) Correction of Input and Output Data, (4) Necessary Coordinate Transformations, (5) Thrust Cut-Off Calculations, (6) Orbital Calculations, (7) Reentry Calculations, (8) Baro-Inertial Coupling Calculations, (9) Situation Calculations, (10) Energy Management Calculations. (Author)

AD-429 040 Div. 12
OTS price $13.50

Auburn Research Foundation, Auburn U., Alabama.
AN ANALYTICAL INVESTIGATION OF SHALLOW ATMOSPHERIC ENTRY.
Final rept.,
by Fred W. Martin and Branimir Djordjevic.
Jan 64, 174p.
Contract AF29 601 5113, Proj. 5797, Task 579712
RTD TDR63 3098 Unclassified report

Descriptors: (*Descent trajectories, Low altitude, (*Guided missile trajectories, Low altitude, Aerodynamic heating, Transfer trajectories, Stability, Ranges (Distance), Drag, Heat transfer, Atmosphere entry, Velocity, Temperature, Atmosphere models, Thermodynamics, Optimization, Equations, Specific heat, Steel, Aluminum alloys, Aluminum, Re-entry vehicles, Angle of attack, Chromium alloys, Nickel alloys.

Several empirical and approximate analytical solutions are given for shallow ballistic reentry. These solutions include a consideration of ballistic parameters from 100 to 6,000 lbs/sq ft. The results of these solutions are compared with digital computer results and with AFSWC TDR-62-50. These comparisons show good agreement with the apparent gross characteristics of shallow angle, near-orbital-velocity reentry. The wall temperature due to aerodynamic heating was calculated for several materials using digital computer trajectories. In addition, the range deviation due to finite stability characteristics was investigated. The reentry path calculations are based on an analytical model which simulates a rotating oblate earth, and utilizes the 1959 ARDC atmosphere. (Author)

AD-429 087 Div. 12
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
UMBILICAL QUICK DISCONNECTS,
by Ara G. Farajian. 16 Dec 63, 14p. Rept. no. TOR269 4303 4
Contract AF04 695 269
Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Disconnect fittings), (*Disconnect fittings, Launching), (*Launching sites, Release mechanisms), Separation, Malfunctions, Failure (Mechanics), Redundant components, Design, Couplings, Reliability, Ground support equipment, Air conditioning equipment, Liquid rocket propellants.

This report on umbilical quick disconnects delineates their function; enumerates their detailed design requirements, with a special emphasis on the redundancy of the release action; and, through sectional views on existing hardware, explains how each design requirement is met. (Author)

AD-429 095 Div. 12
OTS price $22.25

Air Force Missile Test Center Patrick Air Force Base, Fla.
A COMPILATION OF PAPERS PRESENTED AT THE FOURTH JOINT AFMTC - RANGE USER DATA CONFERENCE.
28 Feb 63, 399p.
Unclassified report

Descriptors: (*Guided missile tracking systems, Symposia), (*Guided missile trajectores, Measurement), Data processing systems, Mathematical models, Errors, Ballistic cameras, Radar tracking, Atmospheric refraction, Inertial guidance, Satellites (Artificial), Calibration, Statistical analysis, Guided missile ranges, Ships.

Contents: Error propagation; Ballistic camera accuracy review; MISTRAM; The GLOTRAC system; Advanced range instrumentation ships; The errors of inertial guidance systems; Data smoothing; Applications of data filtering techniques to data processing; Radar analysis progress; The cyclic error as an atmospheric refraction phenomena; Instrumentation errors due to atmospheric refraction; Meteorological support to missile tests; Calibration satellite; Some numerical characteristics of an error model best estimate of trajectory.

AD-429 096 Div. 12, 30
OTS price $3.60

Office of Naval Research, San Francisco, Calif.
RESEARCH RESERVE SPACE SCIENCE SEMINAR: SUMMARY OF PRESENTATIONS SPONSORED BY OFFICE OF NAVAL RESEARCH, 20 OCTOBER-2 NOVEMBER 1963, TREASURE ISLAND, SAN FRANCISCO, CALIFORNIA.
Nov 63, 26p.
Unclassified report

Descriptors: (*Symposia, Astronautics), Astronomy, Astrophysics, Exploration, Planetary atmospheres, Space biology, Manned spacecraft, Space propulsion, Propellants, Spacecraft, Space probes, Space environmental conditions, Space flight, Guidance, Spacecraft docking, Closed cycle ecological systems, Communication satellites (Active), Lasers, Abstracts, Landing impact, Aerobiology.

Contents: General Astronomy and Astrophysics; Astronomy and Space; Space Exploration; Exobiology; Spacecraft; Propulsion and Propellants; Entry and Landing; Space Physiology; Closed Ecological Systems in Space; Deep Space Probes (Unmanned) - Guidance and Control; Space Telemetry, Communications, and Tracking.

AD-429 100 Div. 12, 15
OTS price $1.60

University of Southern Calif., Los Angeles.
ON DESIGN OF TIME OPTIMAL SPACE VEHICLE SYSTEMS.
Interim technical documentary rept.,
by N. E. Nahi. Jan 64, 14p. Rept. no. 103
Contract AF04 695 304, Proj. 3182 730F, Task 02
SSD TDR64 53 Unclassified report

Descriptors: (*Adaptive control systems, Spacecraft), (*Optimization, Design), (*Special functions (Mathematical), Theory), Functional analysis, Feedback, Differential equations, Stability, Differential equations, Nonlinear systems.

A class of systems was introduced where a particular application of the second method of Lyapunov leads to a simple time-optimal feedback solution. A much broader class of systems was identified where a desired time of response can be achieved through the design of appropriate dead-beat systems. A number of examples are included to show the simplicity of the application of the suggested techniques to design of space vehicle systems and systems in general. (Author)

AD-429 104 Div. 12, 15
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SELF-ADJUSTING SYSTEM WITH GRADIENT SEEKING BY THE AUXILIARY OPERATOR METHOD,
by L. G. Yevlanov. 16 Dec 63, 17p.
FTD TT63 1109 Unclassified report

Trans. from Izvestiya An SSSR, OTN, Tekhnicheskaya Kibernetika, 1, pp. 113-120, 1963.

Descriptors: (*Adaptive control systems, Mathematical models), (*Operators (Mathematics), Numerical analysis), Signals, Feedback, Tracking, Integration, Automatic, Optimization.

An analysis is given of criteria of quality and characteristics from the point of view of their possible use in self-adjusting control systems. Special attention is given to the speed with which these criteria are obtained and the accuracy of their calculation. The determination is examined of the pulse transient response system frequency characteristic for statistical signals and sampling action. Restrictions occurring in connection with the use of extremal parametric self-adjusting systems are examined. The effect of time averaging in the calculation of the standard deviation is investigated; the standard deviation of the standard deviation is found as a function of the time averaging. An example is presented. The slow response time of self-adjusting systems when the presented criteria are used is noted as an over-all disadvantage. A quality criterion which permits the response time of the self-adjusted loop to be increased is proposed. (Author)

AD-429 116 Div. 12, 8, 28, 16
OTS price $16.00

Adaptronics, Inc., Alexandria, Va.
FUNCTIONAL CAPABILITY OF NEUROMINE NETWORKS FOR USE IN ATTITUDE STABILIZATION SYSTEMS.
Final rept. 15 Mar 62-15 Mar 63,
by R. J. Lee and R. F. Snyder. Sep 63, 235p.
Contract AF33 657 8646, Proj. 8225, Task 822504
ASD TDR63 549 Unclassified report

Descriptors: (*Stabilization systems, Satellites (Artificial)), (*Adaptive control systems, Spaceborne), (*Bionics, Adaptive control systems), Nerves, Simulation, Automatic, Redundant components, Analog systems, Digital systems, Networks, Learning, Switching circuits, Computer logic, Meteorological satellites, Attitude control systems, Satellite attitude.

An adaptive network illustrating the use of Neurotrons (neuromimes with the ability to learn both analog and logical functions) and Neurotron goals in an adaptive control system is presented, performande data being provided by computer simulation. The use of this system for satellite attitude stabilization is described. Computer flow diagrams and programming data for simulating a Neurotron, Neurotron networks, and goal systems on a digital computer are described. This report also includes mathematical development of a suitable way to digitize the analog Neurotron functions on the computer, a mathematical demonstration that standard electrical equations for RC circuits can be applied to given Neurotron analog functions, and a hardware-oriented discussion of Neurotrons in terms of detailed block diagrams. Based on the computer simulation data and mathematical analyses of Neurotron function, it is concluded that Neurotrons are feasible for providing not only adaptive control functions and stabilization, but that they provide a new type of reliability advantage which stems from their flexibility in terms of learning. This flexibility will not only take care of gradual or catastrophic failures of Neurotrons, but will also compensate for performance degradation in the feedback loop. (Author)

AD-429 148 Div. 12, 8
OTS price $5.60

Sylvania Electric Products Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN) MINUTEMAN EVALUATION TEST PLAN INCLUDING DETAILED REQUIREMENTS AND DETAILED TEST PROCEDURES FOR THE HARDENED MEDIUM FREQUENCY ANTENNAS FIGURE A14127 AND A14128,
by R. Livingston. 10 Dec 63, 1v. Rept. no. MPO PD0052
Contract AF04 694 261
Unclassified report

Descriptors: (*Guided missile antennas, Medium frequency), Test methods, Electrical impedance, Bandwidth, Specifications, Tests, Hardening, Antenna radiation patterns, Performance (Engineering), Test equipment (Electronics), Ranges (Distance), Military requirements.

This test plan shall be used to evaluate the operational capabilities and characteristics of the Minuteman Hardened Medium Frequency Antennas figure A14127 (LF) and A14128 (LCF). The tests will be conducted at a frequency of 450 kc. after the antenna sets have been accepted as per Model Specification S-133-111-9-7 (LF) or S-133-112-9-10 (LCF) depending on the antenna under test. (Author)

AD-429 157 Div. 12, 30
OTS price $11.00

Litton Systems Inc., Woodland Hills, Calif.
THE LITTON FLIGHT DATA COMPUTER AS A RE-ENTRY CONTROL DIRECTOR.
Suppl. to final rept.,
by Daniel O. Dommasch and Charles W. Laudeman.
Nov 63, 136p. Rept. no. SMFD2 6
Unclassified report

Suppl. to AD-425 655.

Descriptors: (*Boost-glide vehicles, Flight control systems), (*Flight control systems, Navigation computers), Feasibility studies, Descent trajectories, Data processing systems, Programming (Computers), Computer logic, Digital computers, Glide path systems, Display systems, Instrument panels, Design, Energy management, Terminal guidance, Optimization, Lift, Landings.

The results are summarized of the investigations carried out during approximately the past year involving utilization of the DOLIAC logic and associated systems for programming the Litton flight data computer (FDC) to provide for safe re-entry and landing of advanced flight vehicles. (Author)

AD-429 211 Div. 12, 27, 26, 14
OTS price $7.60

General Electric Co., Cincinnati, Ohio.
DYNAMIC SHAFT SEALS IN SPACE.
Quarterly rept., no. 6, 15 Aug-15 Oct 63.
15 Oct 63, 73p.
Contract AF33 657 8469
Unclassified report

Descriptors: (*Rotary seals, Shafts), (*Seals (Stoppers), Space environmental conditions), Liquid metals, Potassium, Pressure, Rotation, High-temperature research, Life expectancy, Maintenance, Sealing compounds, Rings, Gaskets, Lubricants, Design, Tests, Test methods, Test equipment, Test facilities, Laminar flow, Turbulence, Couette flow, Specifications, Fluid dynamic properties, Satellites (Artificial).

A theoretical investigation of rotating fluid ring seals was completed. The analysis predicts the performance of plain rotating housing and rotating disk seals. The experimental investiga-

tion of the interface instability associated with rotating fluid ring seals continued utilizing the water seal test rig. The testing provided additional data concerning the extreme operating range of the dynamic zero leakage (DZL) seals which were designed to alleviate the interface instability problem. So far, two seal concepts have been developed which suppressed liquid leakage up to speeds of 20,000 RPM. Water seal testing was also performed on the rotating disk-squeeze seal configuration to obtain additional test data for correlating the squeeze seal results with theoretical analysis. The open loop of the water seal rig facility was converted to a close loop so that other fluids such as oil can be evaluated as sealing fluids. Seal testing for the SNAP 8 project using Dow's ET378 oil was initiated. (Author)

AD-429 301 Div. 12
OTS price $1.10

A.C. Spark Plug Div., General Motors Corp., Milwaukee, Wis.
INERTIAL GUIDANCE SYSTEM PROGRAM 624A - TITAN III.
1 July 63, 5p. Rept. no. 63 212; I09
Contract AF04 695 282
Unclassified report

Descriptors: (*Bibliographies, Inertial (Guidance), (*Inertial guidance, Bibliographies), Configuration, Maintainability, Reliability, Launch vehicles (Aerospace), Errors, Weight, Logistics, Instrumentation, Booster motors.

AD-429 305 Div. 12
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
TRACKING, TELEMETRY, AND COMMAND STUDIES OF GROUND AND SATELLITE SUBSYSTEMS. VOLUME I: SUMMARY,
by F. Geradi. Dec 63, 13p. Rept. no. TDR269 4110 01 13, vol. 1
Contract AF04 695 269
SSD TDR63 334, vol. 1 Unclassified report

Descriptors: (*Satellites (Artificial), Position finding), Satellite networks, Telemeter systems, Ground support equipment, Tracking, Radar tracking, Air Force, Command and control systems, Transponders, Antennas.

Some conclusions are that the integration of command and telemetry with tracking provides a fundamental and substantial benefit in equipment costs, both at the ground sites and in the vehicle. The integration does compromise the performance of communications and tracking to some extent; however, the benefits derived from the use of a single antenna, receiver and transmitter on the ground and in space to accomplish all of these tasks will represent a simplification and significant economies over the conventional tracking arrangement, which involves a multiplicity of equipments. If duplication of equipment is desirable on the basis of system reliability, it is more efficient to duplicate part or all of an integrated system than it is to duplicate part or all of a non-integrated system. The development of an efficient system, able to perform all these functions within a single band of communications frequencies and having a large information bandwidth, both at the satellite and at the ground stations, will permit efficient planning with resulting developmental and operational cost saving. (Author)

AD-429 318 Div. 12
OTS price $9.10

Aerospace Corp., Los Angeles, Calif.
THE INFLUENCE OF TESSERAL HARMONICS ON NEARLY CIRCULAR POLAR AND EQUATORIAL ORBITS,
by P. T. Guttman. 4 Nov 63, 100p. Rept. no. TDR269 4550 10 4
Contract AF04 695 269
SSD TDR63 284 Unclassified report

Descriptors: (*Circular orbit trajectories, Harmonic analysis), (*Perturbation theory, Harmonic analysis), Equations, Motion, Equatorial orbit trajectories, Polar orbit trajectories, Drift, Gravity, Time, Geodesics, Satellites (Artificial), Integration, Numerical methods and procedures, Synchronous satellites.

Effects were determined for some of the tesseral harmonics of the Earth's gravity potential on the motion of nearly circular, polar and equatorial satellite orbits. Analytical expressions are derived and results are presented for the radial, in-track, cross-track and nodal period perturbations resulting from the presence of the second sectorial harmonic. The effects of some of the higher order tesseral harmonics on nearly circular polar orbits are assessed by means of numerical (digital computer) investigations. The influence of tesseral harmonics on the special case of the 24-hour equatorial orbit is determined analytically, and results are presented which illustrate the drifts from the nominal position which occur in this class of orbits as a result of the perturbative forces. Wherever possible, the analytical solutions are compared with results obtained from numerical integration. The high degree of correspondence which is exhibited between the analytical and numerical data serves to substantiate the general results presented. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-427 995 Div. 13, 18
OTS price $9.10

Research Triangle Inst., Durham, N. C.
IMPROVEMENT OF PROTECTION DATA BASE FOR DAMAGE ASSESSMENT AND DATA BASE ON SHELTER NEEDS: VOLUME II.
Final rept.,
by Philip McMullan, John Neblett, Edward Hill, Hale Sweeny and Philip McGill. 13 Jan 64, 1v.
Contract OCD OS62 144, RTI Proj. OU82 83
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), Civil defense systems, Population, Exposure, Electric power production, Mathematical models, Vulnerability, Damage, Analysis, Buildings, Power plants (Establishments), Distribution, Computers, Magnetic tape, Magnetic cores.

This report contains five studies concerned with obtaining, compiling, or analyzing fallout shelter protection data. These studies cover the following subjects: (1) a review of the residential basement data which were obtained from the 1960 U. S. Census of Housing; (2) an examination of electric power availability in the post-attack period, with emphasis upon fallout protection in power plants; (3) the preparation of a procedure for extracting summary distributions of overpressure, reference intensity, and fallout arrival time and relating these to numbers of people exposed; these data are to be extracted from the Attack Environment III output tapes of the Jumbo III damage assessment system; (4) the re-evaluation, with National Fallout Shelter Survey data, of an analytical model for predicting fallout protection for people as a function of their distance from the center of a city; and (5) a statistical analysis of NFSS data from Houston, Texas; and Durham, North Carolina, performed to determine distribution functions expressing their shelter characteristics. These analytical representations of NFSS data are applied, in an illustrative example, to optimal allocation of improvement dollars to ventilating below ground shelters to increase their capacity. (Author)

AD-428 008 Div. 13
OTS price $9.60

Research Triangle Inst., Durham, N. C.
IMPROVEMENT OF PROTECTION DATA BASE FOR DAMAGE ASSESSMENT AND DATA BASE ON SHELTER NEEDS. VOLUME I.
Final rept.,
by Philip McMullan, John Neblett, Joseph Battle, Herbert Campbell and Quentin Ludgin. 13 Jan 64, 1v. Rept. no. R OU82 83
Contract OCD OS62 144
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Civil defense systems), Data processing systems, Damage, Analysis, Casualties, Costs, Population, Power plants (Establishments), Mathematical models, Nuclear warfare, Computers.

AD-428 009 Div. 13, 18, 20
OTS price $21.00

Ammann and Whitney, New York.
STUDY OF SHOCK ISOLATION METHODS FOR CIVIL DEFENCE SHELTERS.
Nov 63, 1v.
Contract DA49 129Eng506
Unclassified report

Descriptors: (*Underground structures, Nuclear explosions), (*Nuclear explosions, Underground structures), (*Shelters, Nuclear explosions), Hardening, Shock waves, Explosion effects, Personnel, Shock resistance, Costs, Springs, Soil mechanics, Protective clothing, Stresses.

The results are presented of a study devoted to the establishment of basic criteria and shock isolation techniques applicable to hardened civil defense shelters for protection of personnel and equipment against ground shock effects from nuclear weapons. The report includes a comprehensive review of the state of the art covering background information from which are established ground-shock input data and shock spectra, personnel and equipment shock tolerance criteria, and appropriate shock-isolation methods. General shock isolation schemes, including spring systems and cushioning materials, are evaluated. Design examples and cost estimates of specific shock isolation systems are presented and discussed for shallow-buried structures with populations of 10, 100 and 250 persons at the 25-, 100-, and 300-p.s.i. blast overpressure levels for a 20-MT surface burst. Recommendations for further study are given. (Author)

AD-428 060 Div. 13, 31
OTS price $3.60

New York U., Coll. of Engineering, N. Y.
STUDY OF CONE-CYLINDER INTERSECTIONS,
by Herbert Becker, Gerald Gurtman and Angelo A. Colao. May 62, 1v. TR SM62 6
Contract NObs78787
Unclassified report

Descriptors: (*Stresses, Stiffened cylinders), Photoelasticity, Load distribution, Loading (Mechanics), Conical bodies, Cylindrical bodies, Tensile properties, Models (Simulations), Structural properties.

Efforts are reviewed on the problem of designing the intersection of a cone coaxial with a cylinder under hydrostatic pressure loading. During the early stages of this program a number of configurations of particular interest to the Bureau of Ships were analyzed using a combination of photoelasticity and theoretical analysis. The purpose was to evaluate intersection configurations which represented designs in existence or planned for the immediate future. A detailed survey is reported of the total program since its inception. During this time basic engineering concepts were developed which would be useful in evolving details of cone-cylinder intersections. These include the development of the two-dimensional experimental procedure combined with three-dimensional theory as a general method of analysis of intersection details, and the procedures for generating an optimum design of a cone-cylinder intersection with and without rings. (Author)

AD-428 061 Div. 13, 31
OTS price $2.60

New York U., Coll. of Engineering, N. Y.
STRESSES AT RING STIFFENED INTERSECTION OF CYLINDER AND REDUCING CONE,
by Herbert Becker and Gerald Gurtman. Aug 62, 24p. TR SM62 8
Contract NObs78787
Unclassified report

Descriptors: (*Stresses, Stiffened cylinders), Photoelasticity, Load distribution, Loading (Mechanics), Conical bodies, Cylindrical bodies, Test equipment, Tensile properties, Models (Simulations), Structural properties.

The stresses in a prototype ring-stiffened cone-cylinder intersection were investigated for a range of fillet radii, by means of axisymmetric theory and two dimensional photoelasticity. Peak stress concentrations for the various models were found to be between 1.00 and 1.78, for fillet radii between 0.500 inches and 0.062 inches. Results reported in the literature showed good agreement of two and three dimensional stress ratios for symmetric bending and tensile specimens. Furthermore, good correlation was obtained between the stress ratios reported for asymmetric specimens investigated in the present study and for symmetric two dimensional specimens reported in the literature. (Author)

AD-428 096 Div. 13, 32
OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET LITERATURE ON PROTECTIVE STRUCTURES AND COMPONENTS.
Comprehensive rept. no. 10, 27 June-27 Sep 63.
14 Nov 63, 9p.
AID P63 120 Unclassified report

Descriptors: (*Construction, Reviews), (*Storage, Reviews), Roads, Barges, Bridges, Reinforced concrete, Trailers, Vehicles, Transportation, Panels (Structural), Beams (Structural), Containers.

A review is presented of Soviet literature on ground support equipment. This report was prepared in response to the following broad areas of interest: operational employment and philosophy, missile data, facilities, transport, launch site, ground support equipment, natural enviromental conditions, personnel, research and development facilities, packaging, preservation, and storage. (Author)

AD-428 257 Div. 13
OTS price $11.00

Texas U., Austin.
CONTEMPORARY CONSTRUCTION COMPONENTS,
by Maurice Irving Ashland. Jan 64, 136p.
Unclassified report

Master's thesis. Original contains color plates: all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Buildings, Construction), (*Construction, Housing), (*Materials, Construction), Concrete, Reinforced concrete, Panels (Structural), Prefabricated buildings, Beams (Structural).

The purpose of this thesis is to advance the science, art, and technique of using components in the construction of contemporary structures in contrast with individual piece-by-piece construction still generally characteristic of today's construction methods. Its goal is an advanced engineering technology resulting in better organized and more beautiful structures with rapidity and economy of construction. The thesis presents an analysis of the use of large manufactured components in the construction of contemporary structures. Many of the components under study may be used in industrial, commercial, public, and residential construction while some of the components may have only a limited application. (Author)

AD-428 283 Div. 13, 2
OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
FAILURE MODES OF IMPACT-LOADED FOOTINGS ON DENSE SAND,
by L. W. Heller. 27 Jan 64, 30p.
Proj. Y F008 08 02 112
NCEL TR R281 Unclassified report

Descriptors: (*Foundations, Reviews), Soil mechanics, Failure, Sand, Soils, Nuclear explosion damage, Impact shock, Underground structures.

This reviews the current (1 July 1963) literature which summarizes the various static and dynamic failure modes observed by several investigators. It also presents an analytical technique which explains the observed failure modes, suggests that the failure mode is dependent upon the footing acceleration during the impact loading, and defines the limiting footing accelerations associated with the two major failure modes. (Author)

AD-428 510 Div. 13, 26
OTS price $4.60

Bureau of Reclamation, Denver, Colo.
HYDRAULIC MODEL STUDIES OF NORTON DAM OUTLET WORKS -- MISSOURI RIVER BASIN PROJECT, KANSAS,
comp by D. L. King. 21 Oct 63, 1v.
BR D Hyd497 Unclassified report

Descriptors: (*Dams, Models (Simulations)), (*Hydraulic models, Dams), Erosion, Pressure, Water waves, Configuration, Design.

This model study determined the energy dissipating efficiency of the hydraulic jump stilling basin for the slide gate controlled outlet works, and the hydraulic operating characteristics of the component features of the structure were observed. Norton Dam, a feature of the Missouri River Basin Project, is located on Prairie Dog Creek about 2 miles from Norton, in northwestern Kansas. The dam is approximately 6,400 ft. long at the crest and rises about 100 ft. above the riverbed. The spillway is located in the right abutment of the dam and consists of a 90-ft.-wide radial gate controlled overflow crest. The design spillway discharge is 95,000 cu ft/sec at the maximum reservoir elevation, 2341.0. The outlet works consist of a bellmouth entrance leading into a 48-in.-dia. circular conduit, a 2-ft. 9-in. sq. high-pressure emergency gate, a 38-in.-dia. circular conduit, a 2-ft. 9-in.-sq. high-pressure regulating gate, a 35-ft.-long diverging rectangular conduit, a 55-ft.-long vertically curved chute, and a 55-ft.-long hydraulic jump stilling basin. The last 21 ft. of the stilling basin consists of a 4:1 upward sloping apron. Maximum discharge is 385 cu.ft/sec. (Author)

AD-428 560 Div. 13, 25
OTS price $16.00

Office of The Director of Defense Research and Engineering, Washington, D. C.
SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS PROTECTIVE CONSTRUCTION.
Dec 63, 244p.
ODDRE B32 Unclassified report

Descriptors: (*Vibration, Symposia), (*Shock (Mechanics), Symposia), Structures, Concrete, Underground structures, Construction, Structural shells.

Division 13 - INSTALLATIONS AND CONSTRUCTION

Contents: Shock Isolation of Structure Contents; Effects of Shape of Load Pulse on Shock Mitigating Characteristics of Vermiculite Concrete and Foamed Plastics; Shock Hardening of Equipment; Shock Isolation for Hardened Missiles and Underground Structures; Test of a Scaled Dynamic Model of the South Building, Norad Combat Operations Center; Shock Effects on the Propellant Loading System of a Missile Complex; The Design of Lined Underground Cavities Subjected to Nuclear Blasts; A Classical Approach to Soil-Structure Interaction for Shallow-Buried Arches Subjected to Blast Loading; Influence of Overpressure on Footing Design; Dynamic Bearing Capacity of Soils-Field Test-The Response of Impulsively Loaded Square Footings on Frenchman Flat Silt; Behavior of Buried Model Arch Structures; Experimental Study of the Response of Buried Structural Elements to Static and Dynamic Surface Loading.

AD-428 592 Div. 13, 20
OTS price $2.60

Bureau of Yards and Docks, Washington, D. C.
THE SUSCEPTIBILITY OF EXISTING NAVAL BUILDINGS TO SUSTAINED FIRES RESULTING FROM THERMAL PULSE FROM THE EXPLOSION OF NUCLEAR WEAPONS,
Final rept.,
by E. W. Cousins and J. R. Young. 23 Jan 63, 18p.
Contract NBy37596
Unclassified report

Report on phase 2.

Descriptors: (*Nuclear explosion damage, Naval shore establishments, (*Naval shore establishments, Buildings), (*Buildings, Protective coverings), Nuclear weapons, Fires, Blast Fire-resistant coatings, Metals, Plastics, Asphalt, Thermal radiation.

This report makes no major change in the principal conclusion of the Phase I report, in that under ideal conditions, a conflagration-type fire is remote in buildings surviving a nuclear blast. There is evidence that on more than moderately blast-resistant buildings, asphalt-protected metal, and plastic siding or roofing sheets will continue to flame when exposed to multi-megaton weapons which do not significantly damage the building by blast. Large-scale building details do not conserve enough heat from transient flaming to produce continued burning on smooth wood surfaces, but small-scale details producing narrow parallel spaces and many edges can produce incipient fire by continued small-scale flaming and glowing spots. No definite information could be obtained for smooth-surfaced built-up roofing; but from results of some components, it is concluded that on a more than moderately blast-resistant building exposed to multi-megaton weapons, the chance of continued burning is great enough to warrant resurfacing with gravel or slag. (Author)

AD-428 774 Div. 13, 15
OTS price $3.60

Naval Research Lab., Washington, D.C.
ELEMENTS OF NORMAL MODE THEORY,
by G. J. O'Hara and P. F. Cunniff. 15 Nov 63, 27p.
Projs. RR009 03 45 5752, SF013 10 01
NRL 6002 Unclassified report

Descriptors: (*Motion, Structures), (*Linear systems, Mathematical analysis), Structural properties, Vibration, Stresses, Deflection, Equations, Statics, Fourier analysis, Dynamics, Differential equations, Integrals, Load distribution, Gravity, Shock, Shock waves, Elasticity.

Elementary normal mode theory is derived and used in defining the dynamic response of linear elastic structures. The theory is derived from the definition of a linear elastic structure by using D'Alembert's principle and only those mathematical methods which are familiar to most engineers and are no more complex than necessary. The cases of free vibrations and response to applied forces and base motion are examined in detail. Each normal mode is shown to respond to dynamic loads as a single-degree-of-freedom system with specific characteristics. Equations are developed for stress and deflection. These can be converted to the form where the stesses or deflections are considered to be composed of two parts: one which ignores inertial effects (the static solution as a function of time) and one which represents a dynamic correction. Generalized Fourier expansions and characteristic load theorems are derived. The general problem of stresses and deflections is presented for arbitrary applied forces and base motions as well as for steady-state conditions. (Author)

AD-429 232 Div. 13, 14, 3
OTS price $8.60

General Mills Inc., Minneapolis, Minn.
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
Bimonthly progress rept. no. 3, 1 Nov-31 Dec 63.
by M. I. Landsberg. 27 Jan 64, 1v. Rept. no. 2507
Contract DA18 108AMC214A, Proj. 52405
Unclassified report

Descriptors: (*Biological warfare, Countermeasures). (*Shelters, Air conditioning equipment). (*Chemical warfare, Countermeasures), Tents, Thermal insulation, Expanded plastics, Filters (Fluid). Cooling and ventilating, Heating, Evaporators, Aerosols, Aerosol generators, Decontamination, Hangars, Textiles, Plastic coatings, Nylon, Dacron, G agents, Mustard gas, Permeability, Degradation, Tents, Helium, Tensile properties, Adhesives, Compressive properties, Heat transfer.

New studies were initiated which included preliminary challenging of the collective protective kit for the tent GP medium using Sm at concentrations in the order of 10 to the 6th power to 10 to the 7th power; development of a sharp cut-off disseminator which produced particles with an NMD of approximately 1.1 microns; material durability determinations; adhesive performance; shock and vibration evaluation of the compression; and evaluation of the heating and cooling portion of the ECS package. The latter included, for efficiency tests, determination of power and air-flow patterns. Hardware components were also up-graded during this period, and feasibility models of the ECS package, including fresh-air purifier, heating and cooling units, and the recirculation systems, were fabricated. Also completed were air locks with improved attachment and valving systems and composite liners (polyurethane foam and butyl-coated fabric) for the GP medium and large tents and for the command post tent. (Author)

AD-429 302 Div. 13, 25
OTS price $2.60

Forest Products Lab., Madison, Wis.
CLASSICAL BUCKLING OF CYLINDERS OF SANDWICH CON-

STRUCTION IN AXIAL COMPRESSION -- ORTHOTROPIC CORES.
Progress rept.,
by John J. Zahn and Edward W. Kuenzi.
Nov 63, 20p.
FPL 018 Unclassified report

In cooperation with Wisconsin U., Madison. Contract AF33 657 63 358.

Descriptors: (*Buckling (Mechanics), Sandwich construction), (*Sandwich construction, Buckling (Mechanics)), Cylindrical bodies, Deflection, Theory, Strain (Mechanics), Stresses, Integral equations, Compressive properties.

Classical small deflection theory is used to derive buckling coefficients for cylinders of sandwich construction under axial compression. The sandwich core is assumed to be orthotropic. (Author)

AD-429 331 Div. 13, 25
OTS price $10.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
DESIGN CHARTS FOR R/C BEAMS SUBJECTED TO BLAST LOADS,
by J. R. Algood and G. R. Swihart. 19 Oct 60, 136p.
Proj. Y F008 10 102
NCEL TR121 Unclassified report

Descriptors: (*Beams (Structural), Design), (*Loading (Mechanics), Blast), Theory, Tensile properties, Concrete, Steel, Tables, Curve fitting, Shear stresses.

An ultimate load theory is combined with an idealized dynamic theory to form a computational program for the development of a set of design charts for reinforced concrete beams. The behavior of beams under blast loading is reviewed to aid in the explanation of the computational program and the charts. A procedure for the treatment of shear and bond is presented; the design curves are given and exemplified; and their limitations are discussed. (Author)

AD-429 332 Div. 13
OTS price $1.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
STATIC LOADING OF SMALL BURIED ARCHES,
by H. L. Gill and J. R. Allgood. 31 Jan 64, 52p.
NCEL R278 Unclassified report

Descriptors: (*Underwater structures, Stresses), (*Stresses, Underground structures), Dynamic, Statics, Pressure, Instrumentation, Deflection, Soils, Structural properties.

Static and dynamic tests have been performed to study the behavior of small buried arches. The objective was to gain information which will serve as a guide in developing design methods for underground structures. This report describes the static tests, the prime purposes of which were: (1) to obtain information on the behavior of a statically loaded soil-arch system, and (2) to provide data for comparison with that from a similar system subjected to blast loading. The test configuration consisted of two conterminous semicircular arches each 30 inches in diameter buried in dry sand with 6 inches of cover over the crown. The arches were identical except for differing footing widths. The entire system was contained by the NCEL atomic blast simulator pit, which is 9 feet by 10 feet in plan and 12 feet deep. Static loads up to 25 psi were applied to the surface of the sand as various measurements were being made. The test results show that the expected decrease in footing deflection with increase in footing width was accompanied by an increase of maximum moment in the arch. (Author)

AD-429 334 Div. 13
OTS price $8.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
EVALUATION OF 150,000-BTU/HR, DUCT-TYPE, PORTABLE, GASOLINE-ENGINE-DRIVEN AND 208/416-VOLT, 400-CYCLE, ELECTRIC-MOTOR-DRIVEN HEATERS.
Rept. for July 59-Feb 63,
by Robert L. Little. 13 Nov 63, 79p.
Proj. 1D643303D54502, Task 8F71 11 001 02
AERDL TR1758TR Unclassified report

Descriptors: (*Heaters, Gasoline), (*Winterization kits, Heaters), (*Housing, Heaters), Electric motors, Internal combustion engines, Drives, Ventilation fans, Performance (Engineering), Fuel systems, Humidity, Salt spray tests, Life expectancy, Vibration, Shock (Mechanics), Guided missiles, Launching sites, Pressure, Environmental tests.

This report covers development and tests of the 150,000-Btu/hr, gasoline-engine-driven and electric-motor-driven heaters. The 150,000-Btu/hr heaters are compatible with winterization kits for the Little John, Hawk, and Pershing Missile Systems and are suitable for quantity procurements. Service life tests of the production heaters have not been completed. (Author)

14. MATERIALS (NON-METALLIC)

AD-427 972 Div. 14
OTS price $1.60

General Technologies Corp., Alexandria, Va.
A STUDY OF HIGH MODULUS, HIGH STRENGTH FILAMENT MATERIALS BY DEPOSITION TECHNIQUES.
Bi-monthly progress rept. no. 1, 1 Nov-31 Dec 63, by L. G. Davies and J. C. Withers. 15 Jan 64, 12p.
Contract NOw64 0176c
Unclassified report

Descriptors: (*Ceramic fibers, Materials), (*Filaments, Vapor plating), Material forming, Brittleness, Refractory materials, Boron, Boron compounds, Titanium compounds, Carbides, Tensile properties, Composite materials.

Candidate filament materials were selected from a list of high modulus-to-density ratio materials. The list was compiled from presently available literature. Materials selected to be investigated had a modulus-to-density ratio of greater than 2.50 x 10 to the 8th power per inch. Of the materials selected, boron, boron carbide, and titanium carbide filaments were deposited by vapor deposition techniques. To assist in the screening of the selected filament materials, a tensile strength tester was designed and built. Upon completion of calibration, the tester will provide a means to evaluate materials and deposition processes. (Author)

AD-428 003 Div. 14, 25
OTS price $1.25

Allied Research Associates, Inc., Concord, Mass.
STUDY OF MATERIALS FOR THERMIONIC CONVERTERS.
Final rept., Dec 61-Dec 63,
by Harold Homonoff and Stanley Ruby. 31 Dec 63, 40p. Rept. no. T9159 3
Contract Nonr3385 00, Proj. NR099 355
Unclassified report

Descriptors: (*Thermionic converters, Materials), (*Electrodes, Thermionic converters), (*Semiconductors, Thermionic converters), (*Cesium, Thermionic converters), Surface properties, Adsorption, Solid state physics, Thermodynamics, Plasma physics, Ions, Tungsten, Oxides, Barium compounds, Cesium compounds, Thermionic emission, Vapor pressure, Thermochemistry.

Contents: Electrode Materials: Surface phenomena, Possible mechanism for (Ba, Sr) O cathode, Effect of purity and crystallographic plane, Properties of metalloids, New materials possessing a high or low work function; Adsorption on Semiconductors: Presence of surface states, Boundary layer phenomena; Development of Long Lived, Low Work Function Collectors for Cesium Thermionic Converters: Necessity for low work function collectors, Processing of collector, Thermochemical considerations.

AD-428 004 Div. 14, 17
OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
A STUDY ON THE PREVENTION OF GALVANIC CORROSION BETWEEN MAGNESIUM AND STEEL,
by William H. Deaver. 8 Nov 63, 15p.
Proj. IH0 24401A110 05
CCL 150 Unclassified report

Descriptors: (*Magnesium alloys, Corrosion inhibition), (*Steel, Corrosion inhibition), Protective treatments, Electric insulation, Organic coatings, Paint primers, Tin coatings, Epoxy plastics, Vinyl plastics, Stannates, Potassium compounds, Sodium compounds, Phosphates, Hydroxides, Salt spray tests, Fatty acids, Metal joints, Corrosion, Electrolytic cells.

A survey is covered of five methods and pretreatments that have been recommended for the prevention or reduction of galvanic corrosion between magnesium and steel. In conjunction with this, 6 primers of various types were evaluated over these pretreatments. Where treatment before assembly can be made only complete insulation will prevent galvanic corrosion. Where treatment before assembly is not possible the stannate process shows promise. (Author)

AD-428 006 Div. 14
OTS price $21.00

Manufacturing Labs., Inc., Cambridge, Mass.
INVESTIGATION OF BORIDE COMPOUNDS FOR VERY HIGH TEMPERATURE APPLICATIONS.
Rept. for Apr 62-Sept 63,
by Larry Kaufman and Edward V. Clougherty. Dec 63, 375p.
Contract AF33 657 8635, Proj. 7350, Task 735001
RTD TDR63 4096, pt. 1 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Refractory materials, Borides), (*Borides, Refractory materials), High temperature research, Preparation, Zone melting, High pressure research, Sintering, Single crystals, Crystals, Hafnium compoumds, Niobium coumpounds, Tantalum coumpounds, Titanium coumpounds, Zirconium compounds, Crystal lattices, Thermal expansion, Resistance (Electrical), Hardness, Thermal conductivity, Specific heat, Vapor pressure, Heat of formation, Phase studies, Oxidation, Refractory coatings, Additives, Mechanical properties, Chemical analysis, Impurities, Transition elements, Tables.

A comprehensive study of the properties of high purity well characterized samples of TiB2, Zrb2, HfB2, NbB2, and TaB2 was performed. Floating zone refining and high pressure hot pressing were used to prepare single crystal and polycrystalline material respectively. An investigation of the sintering mechanism of TiB2 was performed. Powder purification procedures by acid leaching and vacuum heating were examined. Properties measured included lattice parameter, X-ray thermal expansion, linear thermal expansion, electrical resistivity and microhardness. These quantities were obtained for materials which satisfied the sample requirements for the various experiments. Measurements were generally performed between room temperature and 1000 C. Thermal conductivity measurements between 1000 and 2000 C are in progress. (Author)

AD-428 066 Div. 14, 17
OTS price $1.00

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MATERIALS FOR THE SPACE AGE,
by C. W. Douglass, D. H. Cartolano, Harold D. Colwick and Robert L. Buchenauer. Sep 63, 22p.
ASD TDR63 688 Unclassified report

Paper presented at the ASD 1963 Science and Engineering Symposium, 18-19 Sep 63, Wright-Patterson AFB, Ohio.

Descriptors: (*Space environmental conditions, Materials), (*Materials, Symposia), (*Symposia, Materials), Space flight, Seals (Stoppers), Structural parts, Ceramic materials, Electronics, Sealing compounds, Refractory metals and alloys, Reviews.

The scope of the Air Force materials research effort encompasses all advanced system requirements, as reflected by analysis of their mission profile, for which materials capability does not exist. To portray the vital role of materials, a review is made of serveral typical advance system concepts. The most critical materials problems, as represented by primary system components within the major areas of primary and secondary structure, environmental protection, electronics and energy transfer systems are discussed. (Author)

AD-428 108 Div. 14, 30, 1
OTS price $6.60

Kaman Nuclear, Colorado Springs, Colo.
INVESTIGATION OF THE FEASIBILITY OF AN AIRCRAFT-OIL ANALYSIS SYSTEM FOR OPERATIONAL USE IN THE FIELD, PHASE II,
by Vernon Peckham, Phil Jessen and Richard Vogel.
Nov 63, 59p. Rept. no. 676 2FR
Contract DA44 177TC789, Task 1D141812D18423
ATRECOM TR63 55 Unclassified report

Descriptors: (*Lubricants, Chemical analysis), (*Atomic spectroscopy, Lubricants), (*Airplane engines, Lubrication), Airplane engine oils, Feasibility studies, Chemical analysis, Metals, Impurities, Failure (Mechanics), Aircraft, Instrumentation.

Atomic absorption spectrometry and neutron activation analysis were chosen from the many methods available as the best for possible development into field measurement equipment for the analysis of metal content in oil. The spectrometry method appears to be the more suitable of the two using present-day techniques. Statistical studies of the R1820-86 engine oil analysis data were continued and showed that further work on evaluation of the data is needed in order to prove the merits of the oil analysis program. An experimental in-flight detector was designed. Further work is needed to improve the temperature stability of the circuit. Actual running tests are needed to prove its application and usefulness as in in-flight warning device. (Author)

AD-428 129 Div. 14
OTS price $1.60

Narmco Industries Inc., San Diego, Calif.
INTERLAMINAR SHEAR OF FILAMENT-WOUND REINFORCED PLASTICS.
Quarterly progress rept. no. 2, 1 Oct 63-5 Jan 64, by Robert A. Elkin, Boris Levenetz and Bud L. Duft. Jan 64, 4p.
Contract N60921 7094
Unclassified report

Descriptors: (*Composite materials, Filament wound construction), (*Laminates, Mechanical properties), Plastics, Glass textiles, Amino plastics, Epoxy plastics, Shear stresses, Reinforcing materials, Aging (Materials), Finishes & finishing, Compressive properties, Laminated plastics.

Effort was directed to improve interlaminar shear strength of filament-wound reinforced plastic structures. Two approaches to the problem are being studied. Several resin systems which are not normally utilized in filament winding are being evaluated, and new concepts of fiber orientation are being investigated. A Latin Square arrangement is being utilized to evaluate the various parameters. (Author)

AD-428 145 Div. 14, 17, 31
OTS price $2.60

Naval Applied Science Lab., Brooklyn, N. Y.
REPORT OF INVESTIGATION OF CAVITATION EROSION RESISTANCE AND RELATED PROPERTIES OF POTENTIAL HYDROFOIL STRUCTURAL ALLOYS AND COATINGS.
30 Jan 64, 8p.
Proj. SF013 13 01, Task 0906
NASL 9300 17, TM2 Unclassified report

Descriptors: (*Hydrofoils, Materials), (*Alloys, Erosion), (*Coatings, Erosion), (*Erosion, Cavitation), Water, Sea water, Water impingement, Disks, Magnetostriction, Test equipment, Hardness, Corrosion, Corrosive liquids, Steel, Nickel alloys, Stainless steel, Titanium alloys, Copper alloys, Rubber coatings, Synthetic rubber, Plastic coatings, Isocyanate plastics, Elastomers.

This report describes investigations of the cavitation erosion resistance of potential hydrofoil structural alloys and coatings. Relationship between resistance to cavitation erosion and other mechanical and chemical properties of these materials are also discussed. (Author)

AD-428 148 Div. 14, 26, 3
OTS price $3.60

Knowlton Bros., Inc., Watertown, N. Y.
A PROCESS FOR THE MANUFACTURE OF E16 R1 DIFFUSION FELT. FINAL OPERATING DIRECTIVE.
by Horace A. Spencer. 31 Oct 62, 32p.
Contract DA18 108CML7047
Unclassified report

Descriptors: (*Protective mask filters, Manufacturing methods), (*Composite materials, Protective mask filters), Wood pulp, Viscose, Rayon, Glass textiles, Fungicides, Copper compounds, Aromatic compounds.

AD-428 199 Div. 14, 26
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
EXPOSURE TEST DATA ON MIL-P-116 METHODS IA AND IC,
by D. V. Minuti. 6 Jan 64, 7p.
NAEC AML 1836 Unclassified report

Descriptors: (*Packing materials, Military requirements), (*Naval procurement, Containers), Metals, Corrosion inhibition, Moistureproofing, Preservation, Desiccants, Environmental tests, Water vapor.

This study concluded that For Level A packaging where the conditions of time and storage are unknown, corrodible military equipment must be preserved by a contact corrosion preventive compound, volatile corrosion inhibitor, or desiccant, whichever is the most feasible. Conversely, where the storage conditions are known, the need for preservation may diminish as the storage time and/or the severity of environmental conditions decrease. For desiccated packs, the use of containers or barriers with the lowest water vapor transmission rate

(<0.05 grams/100 square inches/24 hours) available is required for Level A use. Again this can be modified if conditions of time and storage are known to be moderate. For non-desiccated packs, the specific inclusion of water vaporproof containers and barriers should be avoided and replaced by the more economical waterproof concontainers. This would permit the use of MIL-B-121 barriers wherever its strength characteristics permit. Where the strength of MIL-B-121 barriers is not adequate, MIL-B-131, Class 1 barrier can be used. The use of MIL-B-131, class 1 in this case is based primarily on the strength of the barrier and not its water vapor transmission rate. (Author)

AD-428 202 Div. 14, 12
OTS price $4.00

IIT Research Inst., Chicago, Ill.
STUDY OF ATTACHMENTS FOR BRITTLE COMPONENTS.
Final rept. Nov 62-Oct 63,
by K. E. Hofer, Jr., N. Bredzs, R. Firestone and J. Rudy. 15 Nov 63, 232p.
Contract AF33 657 8339, Proj. 8259
Unclassified report

Report on ''Utilization of Refractory Nonmetallic Materials in Future Aerospace Vehicles'' Phase 2.

Descriptors: (*Brittleness, Joints), (*Mechanical fasteners, Refractory materials), (*Bonding, Refractory materials), (*Brazing, Refractory materials), Aluminum compounds, Oxides, Titanium compounds, Borides, Adhesives, Ceramic materials, Soldering alloys, Iron alloys, Nickel alloys.

The three disciplines of mechanical fastening, adhesive bonding, and brazing are examined for their application to the problem of attachments in brittle nonmetallic materials. The ultimate objective of this program was to provide information for attachments of Al203 and TiB2 aerospace components. A method for quantitative comparison of joints was proposed. Various joints were studied using this method and the results compared with the work of previous investigators. Significant advances in the art of brazing the two refractory nonmetallics were accomplished. (Author)

AD-428 289 Div. 14
OTS price $3.60

Forest Products Lab., Madison, Wis.
USING THE FPL HARDWOOD VENEER GRADES,
by Henry H. Haskell. Dec 63, 32p.
Rept. no. FPL025
Unclassified report

Descriptors: (*Wood, Plywood), (*Standards, Wood), Plywood, Quality control.

The research contains basic information and essential instructions in the use of the recommended FPL hardwood veneer grades for the development of hardwood veneer log grades. Various characteristics and defects encountered in veneer grading are illustrated and described, showing the influence of each on the grade classification that may be assigned. (Author)

AD-428 476 Div. 14, 13
OTS price $2.60

Bureau of Reclamation, Denver, Colo.
EFFECT OF HEAVY MEDIA PROCESSING OF AGGREGATE ON FREEZING AND THAWING RESISTANCE OF CONCRETE FONTENELLE DAM,
by G. O. Briggs. 30 Dec 63, 18p.
BR D LR C1072 Unclassified report

Descriptors: (*Concrete, Freezing), (*Petrology, Concrete), Particles, Structural properties, Cements, Liquids, Separation, Bromine compounds, Alkanes, Tests, Quality control, Processing, Dams.

This report summarizes results of laboratory tests conducted on concretes containing aggregates from the vicinity of and proposed for use in Fontenelle Dam structures. The investigation described was initiated after preliminary aggregate acceptance tests indicated early surface deterioration in the form of popouts, coarse aggregate failures, and surface scaling of concrete containing this aggregate when exposed to freezing and thawing action. Concretes containing normally processed and heavy media beneficiated aggregates, and with variable water-cement ratios were tested. Results indicate that heavy media beneficiation improves the quality of Fontenelle aggregate by eliminating the lightweight constituents, and slightly benefits the durability of concrete containing this aggregate. Also reduction of water-cement ratio is beneficial to the freeze-thaw resistance of concrete regardless of cure. Petrographic Report No. 61-32, included as Appendix A, covers studies to determine the suitability of heavy media separation for beneficiating this aggregate. Details and conclusions regarding this phase of the investigations are included therein. (Author)

AD-428 478 Div. 14, 13
OTS price $2.60

Bureau of Reclamation, Denver, Colo.
LENGTH CHANGE OF CONCRETE CONTAINING GLEN CANYON DAM AGGREGATE AND VARIOUS CEMENTS, POZZOLANS AND/OR A LIGNIN-TYPE RETARDING AGENT,
by J. R. Graham. 11 Nov 63, 24p.
BR D LR C1068 Unclassified report

Descriptors: (*Concrete, Dams), (*Cements, Concrete), Lignin, Elasticity, Compressive properties, Aging (Materials), Mixtures, Dessicants, Structural properties, Particles.

Glen Canyon Dam, located on the Colorado River in northern Arizona, is a gravity-arch dam containing 5 million cubic yards of concrete. The concrete in the dam proper contains a pozzolanic material as a replacement for a portion of the cement. A preliminary pozzolan investigation, reported in Concrete Laboratory Report No. C-882, evaluated, for compliance with requirements of Specifications No. DS-5053, pozzolans from 74 sources. Selected pozzolans from these sources that met all specifications requirements together with 12 additional pozzolans from different sources were subjected to tests in concrete. Preliminary laboratory concrete investigation, partially reported in Concrete Laboratory Report No. C-526A, was undertaken to evaluate the individual and/or combined effects of various pozzolans and a single lignin base retarding agent on selected properties, such as compressive strength, elastic properties, and length change, including autogeneous and drying shrinkage and expansion due to prolonged moist curing of Glen Canyon Dam concrete. Reported are the results of this investigation. (Author)

AD-428 479 Div. 14, 13
OTS price $3.60

Bureau of Reclamation, Denver, Colo.
PROGRESS REPORT OF TEST RESULTS TO 1 YEAR'S AGE ON CONCRETE CORES DRILLED FROM MASS CONCRETE PLACED IN GLEN CANYON DAM, COLORADO RIVER STORAGE PROJECT DURING 1960 AND EARLY 1961,
by J. R. Graham, 4 Nov 63, 1v.
BR D LR C1067 Unclassified report

Descriptors: (*Dams, Structural properties), (*Concrete, Mechanical properties), Compressive properties, Aging (Materials), Elasticity, Thermal expansion, Tests, Test methods, Cylindrical bodies.

Glen Canyon Dam, a concrete arch structure about 700 feet high, is located on the Colorado River approximately 15 miles upstream from Lees Ferry, Arizona. A concrete core testing program was included in the specifications for the purpose of studying the effects of long-time curing on various properties of interior and exterior mass concrete in this structure with particular regard to compressive strength, modulus of elasticity, Poisson's ratio, homogeneity, etc. Thermal coefficient of expansion tests were also conducted and the results included in this report. This report presents the initial results of tests performed on 10-in. diameter concrete cores drilled from Glen Canyon Dam. (Author)

AD-428 484 Div. 14, 13
OTS price $2.60

Bureau of Reclamation, Denver, Colo.
RESULTS OF TESTS PERFORMED ON 6-INCH-DIAMETER CORES FROM PREPACKED CONCRETE CLEAR CREEK POWERPLANT — UNITS 1 AND 2 TRINITY POWERPLANT UNIT 2 TRINITY RIVER DIVISION CENTRAL VALLEY PROJECT,
by R. E. Good and G. G. Hoagland. 10 Jan 64, 20p.
BR D C1075 Unclassified report

Descriptors: (*Concrete, Mechanical properties), (*Power plants (Establishments), Concrete), Quality control, Compressive properties, Elasticity, Weight, Test methods, Gravel, Sand, Particle size, Air, Porosity.

Conclusions: The prepacked concretes tested are of sufficiently high quality to fulfill the design requirements of these structures. Average compressive strength developed by the cores from Clear Creek Powerplant was 4,260 psi for 13 specimens from Unit 1 and 3,310 psi for 13 specimens from Unit 2. Similar figures obtained from the cores from Trinity Powerplant were 4,090 psi for 7 specimens from Hole 1 and 3,450 psi for 10 specimens from Hole 2. Variations are considerably greater than that expected from conventionally placed concrete. However, inadequate data are available to determine whether or not the wide variation is an inherent property of prepacked concrete. (Author)

AD-428 485 Div. 14, 13
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
EFFECT OF COLOR VARIATION OF CONCRETE ON ITS FREEZING AND THAWING RESISTANCE FLAMING GORGE DAM, 1961,
by G. O. Briggs. 30 Dec 63, 9p.
BR D LR C1073 Unclassified report

Descriptors: (*Concrete, Freezing), (*Cements, Concrete), Colors, Cylindrical bodies, Mixtures, Tests, Structural properties.

Distinct differences in color between interior and exterior concrete and color variations of interior concrete were reported during concrete placing operations at Flaming Gorge Dam in the spring of 1961. Generally, concrete containing pozzolan presented a dark, muddy appearance while exterior concrete without pozzolan was of the usual grey color. In order to determine what effect, if any, these color variations had on properties of the concrete, field-fabricated 6- by 12-in. cylinders along with samples of project cement, pozzolan, and water were shipped to the Denver laboratories for testing in concrete. Freeze-thaw durability testing was performed on 2 field-fabricated 6- by 12-in. cylinders, 1 from interior and 1 from exterior concrete, as well as on 3- by 6-in. specimens cast from 10 laboratory mixes using different combinations of the project cement, pozzolan, and project water in addition to Denver tapwater. Results of these tests are reported. (Author)

AD-428 487 Div. 14, 13
OTS price $2.60

Bureau of Reclamation, Denver, Colo.
INVESTIGATION OF THE RESISTANCE OF ARKANSAS AND REPUBLICAN RIVER SANDS TO ALKALI-AGGREGATE REACTION AND FREEZE-THAW DETERIORATION,
by B. McConnell and R. L. McKisson. 26 Aug 63, 28p.
BR D LR C1058 Unclassified report

Descriptors: (*Concrete, Physical properties), (*Cements, Chemical properties), (*Sand, Chemical properties), Alkali metal compounds, Chemical reactions, Freezing, Melting, Degradation, Compressive properties, Limestone, Water, Particles, Petrology.

Results from alkali-reactivity and freeze-thaw tests are summarized. Results of petrographic examinations of concrete specimens and of physical properties tests performed on the test aggregates are appended. Concretes containing Republican River sand were somewhat more resistant to freezing and thawing than comparable concretes containing aggregate from the Arkansas River when these aggregates were used in combination with high-alkali cement, a quarried limestone coarse aggregate, or an innocuous natural coarse aggregate. However, when used in combination with a reactive coarse aggregate, the reverse was true. Results of the alkali-aggregate reactivity tests indicated sands from both sources are highly reactive. (Author)

AD-428 488 Div. 14, 13
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
TESTS OF SPONGE RUBBER JOINT-FILLER MATERIALS,
by L. J. Mitchell. 3 Sep 63, 14p.
BR D LR C1061 Unclassified report

Descriptors: (*Dams, Concrete), (*Concrete, Joints), (*Joints, Seals (Stoppers)), (*Seals (Stoppers), Rubber), Deformation, Stresses, Foam rubber.

The present design requires that filler materials proposed for use in joints between elevator tower walls and other portions of the structure at Yellowtail Dam must be capable of a high degree of deformation at relatively low loads and repeated high percent recovery to insure permanent closure of these joints. Two approximately 1-foot square samples of sponge rubber concrete joint-filler, Laboratory Samples No. M-4727 and M-4728 were secured and tested to determine their applicability to this type of construction. In particular it was desired to determine the stress deformation curve from zero stress-zero defor-

mation, to a deformation of 50 percent of the original thickness and to then measure the rate of recovery upon load release. This was to be repeated for a second loading on each sample, after which loading was to be repeated utilizing a loading to compress the sample to 25 percent of its original thickness, 75 percent deformation. (Author)

AD-428 489 Div. 14, 13
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
THE EFFECT OF CEMENT COMPOSITION ON STRENGTH, SETTING TIME, AND SLUMP LOSS OF CONCRETE CONTAINING A LIGNIN-TYPE WATER-REDUCING SET-RETARDING ADMIXTURE,
by J. D. Richards. 10 Sep 63, 13p.
BR LR C1062 Unclassified report

Descriptors: (*Concrete, Physical properties), (*Cements, Chemical analysis), (*Additives, Chemical analysis), (*Additives, Surface active substances), Lignin, Organic sulfur compounds, Salts, Compressive properties, Tables, Experimental data, Acids.

This study is an attempt to detect effects of chemical composition of cement on compressive strength, time of set, and rate of slump loss when a ligno-sulfonic acid type water-reducing, set-retarding admixture (WRA) is used in manufacturing concrete. Such studies are difficult due to the formation of numerous complex hydrates during the cement-water reaction. The addition of another substance to the system, such as a water-reducing, set-retarding agent, further complicates an already intricate system. This research attempts only to define certain effects of cement composition on the properties of concrete when the additive is used, rather than explain the mechanism of the chemical reactions taking place. (Author)

AD-428 511 Div. 14, 13
OTS price $2.60

Bureau of Reclamation, Denver, Colo.
APPLICATION OF EXPERIMENTAL CRACK SEALING MATERIALS IN CONCRETE CANAL LINING -- ST. VRAIN SUPPLY CANAL -- COLORADO-BIG THOMPSON PROJECT -- LOWER COST CANAL LINING PROGRAM,
comp. by H. Johns. 6 Aug 63, 19p.
BR D LR P95 Unclassified report

Descriptors: (*Concrete, Protective treatments), (*Inland waterways, Seals (Stoppers)), Fracture (Mechanics), Irrigation systems, Materials, Sealing compounds, Rubber seals, Asphalt, Epoxy plastics, Adhesive tapes, Glass textiles, Plastic seals.

Over the years many different materials and approaches have been used to seal the cracks and joints in concrete-lined canals. This series of tests was started to evaluate under service conditions some of the newer materials specifically for sealing cracks. Mastic joint sealing compounds conforming to Specifications for Sealing Compound, Rubberized, Cold Application, Ready-mixed, for Joints in Concrete Canal Lining, dated February 25, 1960, have been used for this purpose, and with considerable success. Test Sealer No. 21, a mastic conforming to this specification will be used as a standard for comparing the performance of the other materials. A few crack sealing materials were included in the tests started in the New York Canal, Boise Project, in 1956. The present test includes a larger variety and number of materials; also types of sealers not available in 1956 are being investigated in this series. This report covers only the application of materials in the new test; their performance in service will be described in later reports prepared after periodic field inspections. (Author)

AD-428 512 Div. 14, 13
OTS price $2.60

Bureau of Reclamation, Denver, Colo.
PETROGRAPHIC EXAMINATION OF CONCRETE AGGREGATE, AGGREGATE BENEFICIATION INVESTIGATIONS, SAN LUIS DAM, CENTRAL VALLEY PROJECT, CALIFORNIA,
by G. W. DePuy. 25 June 63, 19p.
BR D PR Pet133 Unclassified report

Descriptors: (*Concrete, Petrology), (*Petrology, Concrete), Liquids, Separation, Particles, Bromine compounds, Alkanes, Quality control, Tests, Programming (Computers), Processing.

Concrete aggregates from Panoche Creek deposit (N 1/2 Section 15, T 15 S, R 12 E, MDM) were processed for beneficiation in the Structural and Concrete Branch by the methods of heavy liquid separation, by autogenous abrasion, and by heavy media separation using the laboratory cone separator. The sampls were petrographically examined to evaluate the degree of beneficiation attained by the various methods. This report is a summary of the results of the petrographic evaluation of the beneficiated samples. (Author)

AD-428 514 Div. 14, 13
OTS price $3.60

Bureau of Reclamation, Denver, Colo.
EROSION STUDIES OF PIPE LINING MATERIALS THIRD PROGRESS REPORT,
comp. by H. Johns. June 63, 27p.
BR D LR P93 Unclassified report

Descriptors: (*Pipes, Erosion), (*Plastic coatings, Pipes), Cements, Paints, Phenolic plastics, Polyester plastics, Reinforcing materials, Glass, Fibers, Polyvinyl chloride, Copolymerization, Esters, Vinyl plastics, Epoxy plastics, Steel.

Tests on protective coating materials for steel pipe are a continuing effort to evaluate their relative resistance to the erosive forces produced by silt-, sand-, and gravel-laden water. Exposures simulated by the test conditions sometimes occur in siphon pipes having earth-lined canals upstream. Additional tests were conducted to evaluate the erosion resistance of epoxy mortars, epoxy coal-tar paints, and some of the newer synthetic resin materials. Other tests were made to evaluate the performance of sand-filled conventional paints and to ascertain the erosion effect on unlined steel pipe and an asbestos-cement pipe. Erosion resistance of the materials is compared with coal-tar enamel which is one of two materials generally specified for lining buried steel pipe. Erosion resistance is, of course, only one of many factors considered in the selection of a protective lining for steel pipe. (Author)

AD-428 580 Div. 14, 13
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
INSTALLATION OF BUTYL RUBBER ROOFING--BITUMINOUS INVESTIGATIONS, FY64--ENDERS RESERVOIR GATEHOUSE KANSAS RIVER PROJECTS,
by L. M. Ellsperman. 7 Oct 63, 6p.
BR D LR1337 Unclassified report

Descriptors: (*Butyl rubber, Roofs), (*Aging (materials), Degradation), Composite materials, Glass textiles, Reinforcing materials, Coatings, Specifications, Effectiveness, Sheets.

Butyl rubber sheeting is one of the materials offering possibilities as an improved roofing product. A specimen of 30-mil butyl rubber has remained in excellent condition after 7 years' exposure in our outdoor test where the lower portion of the panel remains under water continuously. The upper portion is exposed to the atmosphere, and an alternating wet and dry condition exists at the center of the test panel. Butyl rubber sheeting has been installed as a test canal lining on two projects and is presently in excellent condition and watertight after 2-1/2 years. (Author)

AD-428 598 Div. 14
OTS price $1.50

United States Rubber Co., Wayne, N. J.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Final rept., 19 Nov 62-18 Nov 63,
by Harold K. Garner and Gerald J. Klender.
7 Jan 64, 61p.
Contract NObs 88232, Proj. SR007 03 03, Task 1000
Unclassified report

Descriptors: (*Phosphonitrile chlorides, Synthesis (Chemistry)), (*Thermosetting plastics, Synthesis (Chemistry)), (*Thermoplastics, Synthesis (Chemistry)), (*Heat resistant plastics, Phosphonitrile chlorides), Electric insulation, Polymers, N-heterocyclic compounds, Chlorine compounds, Organic phosphorus compounds, Polymerization, Copolymerization, Spectra (Infrared).

The objective of this investigation was the development of new thermoplastic and thermosetting resins from phosphonitrilic chloride trimer for high temperature electrical applications. Derivatives of phosphonitrilic chloride trimer were prepared with a portion of the chlorines replaced by thermally stable phenyl or phenoxy blocking groups, and the remaining positions occupied by reactive chloro, ethoxy, or dimethylamino groups. The derivatives or mixtures of derivatives containing phenoxy, ethoxy, and chloro groups in various proportions were thermally polymerized with the elimination of ethyl chloride to give hard, clear, light colored resins. (Author).

AD-428 599 Div. 14
OTS price $6.60

Timely Technical Products Div., Fluorocarbon Co., Pine Brook, N. J.
INVESTIGATION OF SEAL DESIGN AND SEALING TECHNIQUES FOR KEL-F, TEFLON AND HALON.
Comprehensive rept. no. 3 (Final),
by John J. Piszko. 24 Jan 64, 67p.
Contract DA18 108AMC111A
Unclassified report

Descriptors: (*Halocarbon plastics, Fluorine compounds), (*Plastic seals, Halocarbon plastic), Alkenes, Chlorine compounds, Sealing compounds, Seals (Stoppers), Processing.

The purpose of the work performed was to develop sealing processes for Kel-F, Teflon FEP and Halon. A sealing method is desired to hermetically seal a container which will withstand 150 psi internal air pressure and a helium leak test. The work was concentrated on Induction heat sealing, Spin sealing, Sealing with special Fluorocarbon base sealing, material, and Contact heat sealing. (Author)

AD-428 611 Div. 14
OTS price $1.10

Bureau of Reclamation, Denver, Colo.
IDENTIFICATION OF CONCRETE IN TUNNEL LINING BY AN ADMIXTURE OF FLUORESCENT DYES, CLEAR CREEK TUNNEL--TRINITY RIVER DIVISION CENTRAL VALLEY PROJECT.
by K. P. Karpoff. 23 Sep 63, 7p.
BR D LR C1063 Unclassified report

Descriptors: (*Concrete, Identification), (*Fluorescence, Dyes), (*Dyes, Fluorescence), Compressive properties, Quality control, Tests, Cylindrical bodies.

Clear Creek Tunnel was driven through many different types of rock ranging from solid with adequate cover to highly fractured with relatively little cover. This variability in material and environment required the specification of concretes of different quality, as determined by compressive strength tests. These strengths ranged as high as 5,000 psi in sections which ranged from nonreinforced to heavily reinforced. Upon completion of lining and grouting, cores were to be extracted to assure that the specified strengths had been obtained in the in-place lining. For maximum value from results, it was necessary to be able to identify the exact batch from which the cores originated. To accomplish this, tests were performed to evaluate the amount required and the efficacy of additions of fluorescent dyes to the concrete batch prior to placement as well as the effects of the dyes on strength development. It was hoped that the treated batches in place in the lining could then be located and their limits defined by use of an ultraviolet ray lamp. Thus results of tests performed on cores and control cylinders fabricated at the batch plant could be correlated. Results of this investigation are reported. (Author)

AD-428 632 Div. 14, 31
OTS price $6.60

Marine Engineering Lab., Annapolis, Md.
FLUIDS FOR SUBMARINE EXTERNAL HYDRAULIC SYSTEMS,
by A. P. Evans. 20 Jan 64, 58p.
Proj. S R001 07 01, Task 0619
MEL A RDR95 680J Unclassified report

Descriptors: (*Hydraulic fluids, Corrosion inhibition), (*Hydraulic systems, Hydraulic fluids), (*Corrosion inhibition, Hydraulic fluids), Submarines, Sea water, Hydraulic pressure pumps, Hydraulic fluid filters, Gears, Bushings, Bearings, Colloids, Specifications.

A successful search was made for petroleum-base hydraulic fluids with rust-inhibiting qualities adequate to prevent rusting in submarine hydraulic systems contaminated with seawater. Fluids of two types were found with considerably greater rust-inhibiting ability than currently used Navy hydraulic fluids. The type of fluid giving the better rust inhibition deviated from present hydraulic fluid specification requirements in that it emulsified readily with contaminating seawater, whereas the second type did not. Other necessary properties of both fluid types were satisfactory Feasibility of using the emulsifying-type fluid

in submarine hydraulic systems was shown by 1000 hr of satisfactory operation using a hydraulic system mock-up with full scale submarine system components in the presence of 10% sea-water contamination. Technical specification requirements for this type fluid were drawn up. (Author)

AD-428 669 Div. 14, 17, 25
OTS price $2.50

Atomics International, Canoga Park, Calif.
THERMAL PROPERTIES OF REFRACTORY MATERIALS,
by R. E. Taylor and M. M. Nakata. Nov 63, 109p.
Contract AF33 657 7136, Proj. 4776
WADD TR60 581, pt. 4 Unclassified report

Descriptors: (*Refactory materials, High-temperature research), (*Thermal diffusion, Test equipment), (*Thermal conductivity, Refactory materials), Measurement, Iron, Tantalum, Tungsten, Carbides, Titanium compounds, Zirconium compounds, Hafnium compounds, Tantalum compounds, Nitrides, Thermal expansion, Specific heat, Photoelectric pyrometers, Heat transfer, Theory, Bibiliographies, Experimental data.

A new technique for the mesaurement of the thermal diffusivity at high temperatures is described. The diffusivity is determined from the time interval separating two radial isotherms in a cylindrical specimen. The observations are made during the transient heating (or cooling) period, using a sensitive photoelectric pyrometer developed for the purpose. Measurements are reported on Armco iron, Ta, W, TiC, ZrC, HfC, and TaC. Thermal conductivity data were obtained on TiC, TiN, and ZrC, in order to check the previous results and to provide internal standards for testing the new thermal diffusivity technique. Data which disprove the previous literature results are reported on these compounds. Work on the thermal expansion and specific heat of various refractory materials is also described. (Author)

\D-428 791 Div. 14, 4
OTS price $3.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
NITROSO RUBBER RESEARCH, DEVELOPMENT AND PRODUCTION.
Rept. for 1 June-31 Aug 63,
by Marvin M. Fein. 31 Aug 63, 30p. Rept. RD343Q2; RMD8576Q2
Contract DA19 129AMC69X9044, QMC Proj. 7X93 15 004
Unclassified report

Descriptors: (*Synthetic rubber, Production), (*Production, Synthetic rubber), (*Polymers, Synthetic rubber), Decomposition, Fluorine compounds, Carboxylic acids, Nitrogen compounds, Oxygen compounds, Pyrolysis, Copolymerization, Amines, Alkenes, Salts, Organic nitrogen compounds, Viscosity, Mechanical properties, Low temperature research, Halogenated hydrocarbons.

A satisfactory scaleup process for the production of trifluoronitrosomethane was developed. The process involves the decarboxylation of trifluoroacetyl nitrite in refluxing FC-43, (C4F9)3N. Copolymerization of nitroso monomer with tetrafluoroethylene yielded gums of 300,000-500,000 average molecular weight. Means of achieving M values over 1 x 10 to the 6th power are under active investigation. (Author)

AD-428 792 Div. 14
OTS price $4.60

Borden Co., Philadelphia, Pa.
STUDY LEADING TO THE DEVELOPMENT OF REINFORCED HIGH TEMPERATURE ELASTOMERS.
Quarterly progress rept. no. 3, 1 Apr-30 June 63, by K. C. Tsou, R. N. Boldey and B. D. Halpern. 30 June 63, 38p.
Contract DA36 034AMC3791W
Unclassified report

Descriptors: (*Heat resistant plastics, Silicone plastics), (*Silicone plastics, Reinforcing materials), (*Reinforcing materials, Synthetic rubber), (*Synthetic rubber, Reinforcing materials), Fibers, Talc, Silanes, Silicon compounds, Dioxides, Chlorine compounds, Alkane, Alkenes, Additives, Stability, Tensile properties, Mechanical properties.

The use of certain grades of fibrous talc improved the high temperature tensile strength of silicone rubbers, when used with modified or unmodified silica. The improvement is due to both the fibrous nature of the talc as well as the heat-stabilizing effect of iron oxide present in talc. Optimum loading concentration was determined. Modification of the fibrous talc by chlorosilanes was successful, and initial results from the use of such modified talc and the trimethylsilyl (TMS) modified silica improved high tensile strength on aging at 500F. and testing at 500F. It is possible now to achieve tensile of 460 psi for a silicane rubber at 500F. after aging for 48 hrs. at 500F. (354-69-0-1). When a filler modified with trimethylchlorosilane and vinylchlorosilane was used, the elongation at high temperature was improved. (Author)

AD-428 800 Div. 14, 12
OTS price $2.60

Wyandotte Chemicals Corp., Mich.
IMPREGNANTS FOR EXPANDABLE RIGIDIZABLE AEROSPACE STRUCTURES.
Quarterly progress rept. no. 5, 1 Aug-31 Oct 63. 3 Oct 63, 17p.
Contract AF33 657 9174, Proj. 7340, Task 734005
Unclassified report

Descriptors: (*Inflatable structures, Aerospace craft), (*Glass textiles, Impregnation), (*Laminated plastics, Isocyanate plastics), Stability, Physical properties, Deformation, Elasticity, Aging (Materials), Catalysts, Temperature, Polymerization, Epoxy plastics, Amines, Ketones, Synthesis (Chemistry), Polymers.

Select candidate materials arising from earlier investigations were more fully characterized. Investigations of a fluted glass fabric, as a candidate structural component for rigidizable structures, were performed. Two ketone blocked amines were synthesized and characterized. Included in this report are investigations of flexural properties of urethane laminates and shelf stabilities of urethane prepolymers at various temperatures. Also included is the investigation of curing rates of urethane laminates at various temperatures. (Author)

AD-428 836 Div. 14, 16
OTS price $1.60

Walter Reed Army Inst. of Research, Washington, D. C.
THE FABRICATION AND COLORING OF THE PIGMENTED PLASTISOL RREP COSMETIC GLOVE,
by Joseph Ouellette. Nov 63, 9p.
Proj. 3A012501A82 03
WRAIR TR6317 Unclassified report

Descriptors: (*Prosthetics, Manufacturing methods). (*Manufacturing methods, Artificial limbs). (*Gloves, Prosthetics). Colors.

A new method for coloring resin rich stain resistant cosmetic gloves has been developed. The technique consists in preparing a dilaminar glove comprising a thin clear outer layer and a heavy inner layer. The inner layer has the pigments dispersed in it to give the desired shade. The outer layer is spray tinted on its outer surface to achieve the dispersion of colors found in human skin. The advantage of the method is that an illusion of depth of color is achieved and rubbing off of pigments as occurs in conventional gloves is not possible. (Author)

AD-428 886 Div. 14, 16, 26
OTS price $7.60

Battelle Memorial Inst., Columbus, Ohio.
ELASTOMERS FOR FUEL SYSTEMS CONTAINING MICROORGANISM-CONTROLLING ADDITIVES.
Rept. for 1 Oct 62-31 Aug 63,
by C. W. Cooper, H. T. Kemp and R. M. Kell.
31 Dec 63, 70p.
Contract AF33 657 9804, Proj. 7340, Task 734005
RTD TDR63 4195 Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Fuel systems, Plastic coatings), (*Jet engine fuels, Microorganisms), (*Coatings, Degradation), (*Microorganisms, Control). Isocyanate plastics, Elastomers, Polymers, Rubber coatings, Fuel seals, Organic sulfur compounds, Fluorine compounds, Epoxy plastics, Corrosion, Fuel tanks, Aluminum alloys, Seals (Stoppers), Synthetic rubber, Bacteria, Fungi, Growth, Inhibition, Test methods, Microscopy, Electron microscopy, Additives.

An investigation is being conducted to develop aircraft integral fuel tank coatings capable of resisting microbiological deterioration or growth. Jet-fuel microbial isolates were obtained and adapted to growth in contact with fuel and appropriate elastomers. A number of potentially effective biocides are being evaluated in a commercial two-part polyurethane coating. Aluminum corrosion tests are also under way in jet-fuel culture sytems. In connection with this, the possible effect of biocides on aluminum is also being investigated. A need still exists for a completely satisfactory quantitative method for determining the degree of coating deterioration caused by microorganisms. Thus far, microscope techniques appear most satisfactory, with electron-microscope examination being preferable to light-microscope evaluation. Other methods under investigation include the use of the CRC penetration test, electrical-resistance measurements, and penetrating fluorescent dyes. (Author)

AD-428 896 Div. 14, 4, 31
OTS price $1.60

Monsanto Research Corp., Dayton, Ohio.
FIRE RESISTANT HYDRAULIC FLUID FOR SUBMARINES.
Bimonthly rept. no. 2, 1 Dec 63-31 Jan 64,
by E. S. Blake, R. E. DeBrunner, D. A. Dalton and J. A. Webster. 31 Jan 64, 10p.
Contract NObs90095
Unclassified report

Descriptors: (*Hydraulic fluids, Submarines), (*Organic phosphorus compounds, Synthesis (Chemistry)), (*Synthesis (Chemistry), Fluorine compounds). Stability, Hydrolysis, Flammability, Compatibility, Paints, Elastomers, Esters, Phosphonic acids, Phosphates, Aromatic compounds, Amides.

Studies to determine the relative hydrolytic stabilities of fluorine-containing phosphorus were carried out. These were followed by an intensive synthesis effort with major emphasis on fluid properties, fire-resistance, and compatibility with paints, elastomers, and conduit sheathing materials. The resulting structure/property correlations will permit design of a fluid for submarine use. (Author)

AD-428 905 Div. 14, 31
OTS price $7.60

Ordnance Research Lab., Pennsylvania State U., University Park.
SOLID GLASS AND CERAMIC EXTERNAL-PRESSURE VESSELS,
by J. D. Stachiw. 15 Jan 64, 1v.
Contract NOw63 0209c2
Unclassified report

Descriptors: (*Pressure vessels, Materials), (*Ceramic materials, Pressure vessels), (*Glass, Pressure vessels), Underwater, Brittleness, Compressive properties, Weight, Creep, Fatigue (Mechanics), Underwater explosions, Hydrostatic pressure, Impact shock, Protective treatments, Elasticity, Stresses, Aluminum compounds, Oxides, Stiffened cylinders, Joints, Model tests, Shock resistance, Aluminum alloys, Oceanographic vessels, Submarines, Deflection, Pressure, Strain (Mechanics).

SOLID glass or ceramic hulls provide the maximum buoyancy and internal useful volume for underwater vehicles. This material displays low creep characteristics and withstands external pressure cycling and mild underwater dynamic pressures. Scratches on the exterior surfaces do not decrease appreciably the compressive and elastic strength of such vessels when exposed to either static or cycling pressure. Connectors have been devised that enable glass cylinders to be joined into a monolithic structure that is resistant to both pressure and flexure. (Author)

AD-428 909 Div. 14, 31, 9
OTS price $1.60

Naval Applied Science Lab., Brooklyn, N. Y.
REPORT OF INSPECTION AND PROGRESS IN APPLICATION OF STELLITE 6B OVERLAYS OF HIGH POINT (Pc(H)-1).
5 Feb 64, 9p.
Proj. SF013 13 01, Task 0906
NASL LP9300 17TM4 Unclassified report

Descriptors: (*Hydrofoil boats, Maintenance), (*Structural parts, Hydrofoil boats), (*Propellers (Marine), Maintenance), Damage, Erosion, Coatings, Corrosion, Cavitation, Steel, Metal coatings, Cobalt alloys, Chromium alloys,

Cladding, Patrol craft, Epoxy plastics, Vinyl plastics, Isocyanate plastics, Plastic coatings.

An inspection of the struts, nacelles and foil assemblies of PC(H)-1 showed: (1) damage to coatings of struts, nacelles and foil downstream of forward propellers includes erosion and adhesion separation; (2) damage to strut, nacelle and foils areas downstream of forward propellers and in other areas is caused by static and high velocity corrosion of exposed HY-80; (3) severe erosion damage of sea water inlets in struts had occurred; (4) blistering of the anti-corrosive and anti-fouling coatings (Navy formulas 117, 119 and 121) occurred on the aft foils; (5) the adhesive strength of the polyurethane coating applied to the sea water inlets and areas of the leading edge of the aft foil was low; and (6) the coating on the forward foil and strut assembly, and on areas approximately 15 inches above the aft natelle-strut joint, were in good condition. The fabrication and application of Stellite 6B overlays to areas of the aft struts and foils of Pc(H)-1 were initiated. (Author)

AD-428 913 Div. 14
OTS price $1.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
DIESTER OIL RESISTANCE TEST OF SPECIFICATION ORGANIC FINISHES,
by R. S. Adler. 6 Jan 64, 10p.
NAEC AML 1847 Unclassified report

Descriptors: (*Coatings, Aircraft finishes), (*Degradation, Lubricants), (*Aircraft finishes, Discoloration), Epoxy plastics, Primers, Nitrocellulose, Acrylic resins, Varnishes, Organic coatings, Oils.

Various specification aircraft coatings were exposed to diester oil at room temperature and 135 F for three weeks. The nitrocellulose acrylic finish and the specification epoxy finish showed satisfactory diester oil resistance properties. The type of overcoating used for touch up of the nitrocellulose acrylic finish affects the overall performance of the finish. (Author)

AD-428 919 Div. 14
OTS price $3.60

Forest Products Lab., Madison, Wis.
PERFORMANCE OF JOINTS WITH EIGHT BOLTS IN LAMINATED DOUGLAS-FIR,
by D. V. Doyle. Jan 64, 31p.
FPL 10 Unclassified report

Descriptors: (*Wood, Laminates), (*Bolted joints, Construction), Tensile properties, Compressive properties, Shear stresses.

This report presents the results of research conducted at the Forest Products Laboratory to study the performance of bolted joints that are similar to the gusset plate or tension splice joints used in joining the lower chord members of a timber truss. The joints were three-member assemblies consisting of a 3-1/4- by 7-1/2-inch laminated Douglas-fir member and two steel side plates with two rows of four bolts acting in double shear parallel to the grain of the wood. (Author)

AD-428 921 Div. 14, 22
OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
EFFECTS OF HIGH TEMPERATURE AND HUMIDITY ON OBTURATOR BAND MATERIALS FOR USE WITH 81MM MORTAR CARTRIDGES,
by Robert A. Reisman. Jan 64, 8p.
AED TM1285 Unclassified report

Descriptors: (*Mortar ammunition, Obturation (Ballistics)), (*Obturation (Ballistics), Plastic seals), Polyvinyl chloride, Stability, High temperature research, Humidity, Temperature, Tensile properties, Impact shock, Environmental tests, Cartridges, Projectiles, Anti-personnel ammunition, Fragmentation ammunition.

Six types of plastic obturator band materials were tested to determine mechanical and dimensional stability under high temperatures and extreme humidity conditions. It was found that high temperature and humidity expanded the outside diameter of the obturators but to such limited extent that obturating characteristics of materials tested should not be significantly affected. Tensile and impact strengths were not significantly affected, though there was an appreciable reduction in percent elongation. (Author)

AD-428 964 Div. 14
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
CHEMICALS AND PROCESSES USED IN AIRCRAFT MAINTENANCE AND OVERHAUL; INVESTIGATION OF FLAMMABILITY OF TRICHLOROETHYLENE.
30 Jan 64, 2p.
Proj. C02RMA04 10
NAEC AML1864 Unclassified report

Descriptors: (*Organic solvents, Flammability), Alkenes, Chlorine compounds, Decomposition, Hazards.

AD-429 011 Div. 14
OTS price $4.60

Chance Vought Corp., Dallas, Tex.
THE PREDICTION OF OXIDATION RATES OF CARBONACEOUS MATERIALS FROM PLASMA ARC TESTS 00.241,
by J. K. Haviland and J. E. Medford. 21 June 63, 1v.
Contracts AF33 616 7947; AF33 657 8057
Unclassified report

Descriptors: (*Refractory materials, Reentry vehicles), (*Heat shields, Refractory materials), (*Composite materials, Refractory materials), Pyrolytic graphite, Graphite, Plasma jets, Test equipment, Ablation, Oxidation, Spallation, Refractory coatings, Diffusion, Theory, Styrene plastics, Acrylic resin, Nylon, Fluorine compounds, Reinforcing materials, Tables.

In the search for high temperature materials to withstand reentry conditions, a considerable amount of attention has been given to high temperature of sublimation, its superior materials. A set of equations was derived to account for surface recession rates due to oxidation and spalling, and a method was developed to derive the required material constants from plasma arc test results. Tests were restricted to reinforced carbonaceous material. It is believed, however, that the methods developed are applicable to any material which undergoes oxidation, and in which the chemical form is relatively independent of temperature. Matrix III, showed particular promise as an

oxidation resistant material. This relies on an internally diffused coating, as opposed to a surface coating, and is therefore not liable to suffer catastrophic failure. (Author)

AD-429 132 Div. 14, 4
OTS price $2.60

United States Rubber Co., Wayne, N. J.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Quarterly rept. no. 1, 1 Nov 63-31 Jan 64, by Harold K. Garner, Gerald J. Klender, and Aspet Merijanian. 31 Jan 64, 24p.
Contract NObs90089, Proj. SR007 03 03, Task 1000
Unclassified report

Descriptors: (*Organic phosphorus compounds, Synthesis (Chemistry)), (*Polymers, Organic phosphorus compounds), (*Nitriles, Polymers), (*Electric insulation, Polymers), Ethers, Aromatic compounds, Chlorine compounds, Amines, Thermosetting plastics, Electrical properties, Heat, Oxidation, Stability.

The objective of this investigation is the development of new thermoplastic and thermosetting resins from phosphonitrilic chloride trimer for high temperature electrical applications. (Author)

AD-429 134 DIV. 14, 13
OTS price $26.00

IIT Research Inst., Chicago, Ill.
STRUCTURAL MATERIALS FOR HARDENED PERSONNEL SHELTERS.
Final rept., Apr 62-June 63, by John A. Havers. Dec 63, 1v.
Contract OCD OS62 66, IITRI Proj. M254, Subtask 1151A
Unclassified report

Descriptors: (*Shelters, Materials), (*Underground structures, Design), Steel, Concrete, Glass textiles, Plastics, Laminates, Soil mechanics, Structures, Mathematical analysis, Structural parts, Costs, Wood, Configuration, Reinforced concrete, Nuclear explosions.

Structural materials are evaluated for use in fully-buried personnel shelters, located above the ground water table. Analytical relationships are supplied for the structural elements of these shelters, assuming shelter configurations of a rectangular cubicle, a horizontal 180 degree arch and full cylinder, and a 180 degree dome and full sphere. In-place costs are derived for suitable structural materials, and cost equations are supplied for estimating the in-place cost of structural elements. Various structural units are used in preparing alternative designs for a 100-man capacity shelter in the 10 to 200 psi over-pressure region. Cost trends are indicated, and minimum structural costs are related to design level of overpressure. (Author)

AD-429 240 Div. 14, 25
OTS price $3.60

Bausch and Lomb, Inc., Rochester, N. Y.
INFRARED COATING STUDIES.
Quarterly rept. no. 3, 15 Sep-15 Dec 63, by A. F. Turner. 15 Dec 63, 12p.
Contract DA44 009AMC124
Unclassified report

Descriptors: (*Infrared optical materials, Reflection), (*Coatings, Vapor plating), Films, Lithium compounds, Fluorides, Germanium, Lead compounds, Chlorides, Evaporation, Vacuum furnaces.

This report is in two sections and is concerned with the problem of enhancing the reststrahlen reflectance of evaporated LiF films by means of essentially non-absorbing dielectric layers. Section I contains the experimental results obtained by coating LiF films with films of germanium, and with film combinations of lead chloride and germanium. Section II presents computational results on reststrahlen enhancement. (Author)

AD-429 245 Div. 14, 25
OTS price $2.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
METHOD FOR COMPUTATION OF HIGH-RATE TENSILE STRENGTH OF PLASTICS FROM STATIC STRENGTH DATA, by S. Goldfein. 15 Nov 63, 20p.
Task 1D024401A11402
AERDL TR1759TR Unclassified report

Descriptors: (*Plastics, Tensile properties), (*Laminates, Tensile properties), Experimental data, Equations of state, Rupture, Low temperature research, Mathematical analysis.

This report covers an investigation to determine if the high-rate tensile strength of plastics can be calculated from the results of static strength tests at low temperatures. Nineteen plastics were investigated. A simplified version of a mechanical-chemical equation of state in conjunction with master rupture curves drawn from low-temperature test data was found to be all that was necessary to determine this property. The report concludes that: (1) High-rate tensile strength may be calculated from static strength data by means of a simplified verions of a mechanical-chemical equation of state. (2) Short-time strength in the elapsed time period of 3 to 13 milliseconds was found to be equivalent to the ultimate or static tensile strength at -32 F. (Author)

AD-429 246 Div. 14, 22
OTS price $2.60

Springfield Armory, Mass.
ONE-YEAR TROPICAL EXPOSURE TEST OF WOOD STOCKS AND PLASTIC STOCKS FOR THE M14, 7.62MM, RIFLE, by J. Szanto. 27 May 63, 21p.
SA TR11 2637 Unclassified report

Report on Rifle, 7.62MM, M14 - Continued Development of Plastic Stocks and Handguards.

Descriptors: (*Small arms, Structural parts), (*Plastics, Tropical tests), (*Wood, Tropical tests), Heat, Humidity, Fungi, Insects, Rodents, Environmental tests.

Fiber glass reinforced plastic stocks were compared with wood stocks for weatherability. Five walnut and five birch stocks were tested at the NRL Tropical Exposure Site, Canal Zone, together with five plastic stocks of the latest design. The effect of heat, humidity, and mildew under tropical wet conditions was determined from these tests. The damaging effect caused by chewing or biting or boring insects, vermin, rodents, and other forms of life indigenous to the area was also determined from these tests. Fiber glass reinforced plastic stocks successfully withstood the one-year exposure to tropical environment. Procedure is described and results discussed. (Author)

AD-429 247 Div. 14
OTS price $6.60

Oklahoma U. Research Inst., Norman.
BEARING AND LUBRICANT PROBLEMS.
Final rept., 1 Sep 62-31 Aug 63,
by Darrel G. Harden. 3 Feb 64, 65p.
Contract AF34 601 14089, Proj. 1384 4
Unclassified report

Descriptors: (*Lubricants, Scientific research), (*Bearings, Lubrication), Airplane engine oils, Ball bearings, Heat exchangers, Fuel contamination, Aviation fuels, Thermal diffusion, Oils, Viscosity, Physical properties, Corrosion inhibition, Lubricant additives, Military requirements, Turbosuperchargers.

Problems which were successfully completed and on which final reports were submitted are (1) suitability of grade 1100 aviation oil after contamination with aviation gasoline, (2) determination of a suitable lubricant for use in ram air turbines, (3) determination of a suitable lubricant for lead screws of missile attitude stands, (4) inspection of J79/F104 Teleflex box bearings, (5) engineering study of ball bearings P/N VI-224248, (6) inspection of bearings from air turbine assembly P/N 202280 and 202290, (7) investigation of pour point of refrigerator compressor oils, (8) prevention of freezing in an evaporative heat exchanger by using constant boiling mixtures, and (9) determination of a suitable high temperature lubricant for swivel joints in the hot air bleed line of KC-97 superchargers. Progress made in each of these areas is summarized and a complete discussion is included, either as a final report or as a year end summary of the progress to date. (Author)

AD-429 329 Div. 14, 17, 26
OTS price $6.60

Defense Metals Information Center, Columbus, Ohio.
SELECTED ACCESSIONS,
comp. by Mary F. Banks. Jan 64, 47p.
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Bibliographies, Materials), (*Materials, Bibliographies), Alloys, Metals, Material forming, Machining, Welding, Mechanical properties, Metallurgy, Refractory materials, Ceramic materials, Physical properties, Coatings, Composite materials, Abstracts, Indexes.

15. MATHEMATICS

AD-427 959 Div. 15
OTS price $2.60

Stevens Inst. of Tech., Hoboken, N. J.
THE ITALIAN CONTRIBUTION TO THE THEORY OF NON-LINEAR ORDINARY DIFFERENTIAL EQUATIONS AND TO NONLINEAR MECHANICS DURING THE YEARS 1951-1961,
by R. Conti, D. Graffi and G. Sansone. 1963, 26p.
Contract AF49 638 878
AFOSR 3745 Unclassified report

Descriptors: (*Nonlinear differential equations, Reviews), Mechanics, Numerical analysis, Nonlinear systems, Equations, Synchrotrons.

The report is limited to a short presentation of the contribution made during the last decade by Italian mathematicians, with two exceptions. The first refers to the work made by Spanish mathematicians. (Author)

AD-428 074 Div. 15, 20, 16, 25
OTS price $1.60

RAND Corp., Santa Monica, Calif.
NUMERICAL SOLUTION OF FUNCTIONAL EQUATIONS BY MEANS OF LAPLACE TRANSFORM-III. THE DIFFUSION EQUATION,
by R. E. Bellman, R. E. Kalaba and J. Lockett.
Jan 64, 14p. Memo no. RM3974NIH
Grant GM09608 02
Unclassified report

Descriptors: (*Numerical methods and procedures, Equations), (*Integral transforms), Differential equations, Programming (Computers), Programming languages.

A new method for the numerical integration of the heat or diffusion equation is presented. This hinges on the numerical inversion of Laplace transforms. One advantage over the usual finite difference schemes is that a small amount of computation yields the solution for large values of the time. Results of some computational experiments are presented together with the FORTRAN programs. (Author)

AD-428 084 Div. 15
OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
THE SOLUTION OF ALGEBRAIC EQUATIONS BY ROOT FINDING TABLES PART I-INSTRUCTIONS,
by Kurt H. Haase. Dec 63, 79p.
Proj. 5628
AFCRL 63 559, pt. 1 Unclassified report

Descriptors: (*Polynomials, Mathematical analysis), (*Tables, Polynomials), Equations.

A technique is presented for factoring polynomial of odd degree as a product of one or three linear polynomial factors and a residue factor that is a polynomial of even degree. A polynomial of even degree is factorized as a product of two or four linear polynomial factors and a residue polynomial of even degree. The linear polynomial factors are recognized by scanning through a power table and improved to any desired degree of accuracy and eliminated by the Horner method. A residue polynomial or a polynomial of even degree with no recognizable linear polynomial factors is factorized in a number of quadratic polynomial factors equal to half the degree of the polynomial. The coefficients of the quadratic polynomial factors are recognized by scanning through a polynomial table and improved to any degree of accuracy by the Collatz method. A polynomial of Degree 4 is factorized according to a particular technique. (Author)

AD-428 090 Div. 15
OTS price $9.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE SOLUTION OF ALGEBRAIC EQUATIONS BY ROOT FINDING TABLES PART II-POWER TABLE AND POLYNOMIAL TABLES,
by Kurt H. Haase. Dec 63, 115p.
Proj. 5628
AFCRL 63 559, pt. 2 Unclassified report

Descriptors: (*Tables, Polynomials), Equations, Algebra.

Two numerical tables referred to as 'Power Table' and 'Polynomial Tables' are presented. The first one tabulates n to the i power in the ranges 0 less than or equal to n less than or equal to 2.00 in steps of 0.01 and 1 less than or equal to i less than or equal to 12 in steps of 1.00. The Polynomial Tables contain TABLE 0 for polynomials of odd degree, and TABLE 1 of polynomials of even degree are tabulated. The variables range in 0 less than or equal to x less than or equal to 1.00 and 0 less than or equal to y less than or equal to 2.00 with a step increase of 0.05. The Power Table is provided for the evaluation of polynomials at real values of the variable. The Polynomial Tables are provided for finding a quadratic polynomial factor of a polynomial. (See also AD-427 882). (Author)

AD-428 118 Div. 15
OTS price $4.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
ASYMPTOTIC EFFICIENCY OF A CLASS OF c-SAMPLE TESTS,
by Madan Lal Puri. Nov 63, 40p. Rept. no. IMM NYU314
Contract Nonr28538
Unclassified report

In cooperation with Statistical Lab., California U., Berkeley, Contract Nonr22243.

Descriptors: (*Statistical tests, Mathematical analysis), Analysis of variance, Distribution theory, Statistical analysis, Probability, Statistical distributions.

A c-sample problem is considered by examining the 2-sample problem and generalizing the results obtained by other authors. The resulting L-test for testing the equality of c continuous probability distributions on the basis of c independent random samples is proposed. Under suitable regularity conditions and certain assumptions concerning the distribution function, the limiting distribution of L is derived. A number of well known tests are included; e.g. the Kruskal-Wallis H-test, Terpestra's K-sample test, Fisher-Yates-Terry-Hoeffding normal score test, and Van der Waerden's 2-sample test. The asymptotic relative efficiencies in Pitman's sense are obtained and shown to be independent of the number of samples. (Author)

AD-428 251 Div. 15
OTS price $5.60

Texas A. and M. Coll., College Station.
AN ITERATIVE TECHNIQUE FOR APPROXIMATING SOLU-

TIONS TO CERTAIN DIFFERENTIAL EQUATIONS BY TRUNCATED LEGENDRE SERIES,
by Robert Platt Heckrotte. Jan 64, 54p.
Unclassified report

Master's thesis.

Descriptors: (*Differential equations, Numerical analysis), Fourier analysis, Series, Programming (Computers), Programming languages, Special functions (Mathematical), Polynomials.

An iterative method for obtaining numerical approximations to solutions of ordinary differential equations is presented. It is, essentially, one developed by Picard. The successive approximations necessary for convergence are in the form of truncated Fourier series of Legendre Polynomials. Certain properties of orthogonal functions are necessary for the development of this study. The method employed and proofs of convergence as well as those numerical techniques that are used in effecting the approximate solution of the differential equations are presented. An explanation is made of the steps necessary to prepare a differential equation for the IBM computer program. Six examples of differential equations solved by the method proposed are given and the numerical results obtained are discussed. The appendix contains a listing of the Fortran computer program which accomplished the numerical portion of this study. (Author)

AD-428 343 Div. 15
OTS price $3.60

Harvard U., Cambridge, Mass.
THE LOCATION OF THE ZEROS OF THE DERIVATIVE OF A RATIONAL FUNCTION, REVISITED,
by J. L. Walsh. 1960, 33p.
Contracts AF49 638 514, AF49 638 845
AFOSR 3076 Unclassified report

Descriptors: (*Complex variables, Polynomials), Functions, Geometry, Rings, Inequalities, Topology, Geometric forms, Quantum mechanics, Continuum mechanics, Green's functions.

From the general standpoint of circle geometry and linear transformations of the plane, the following theorem is formulated: Let there be given a (closed) circular region C and two fixed points Z and z exterior to C. Let a number of particles have C as their locus with the requirement that their center of gravity with respect to Z shall be the inverse of Z in the boundary of C. Then the locus of the center of gravity of these particles with respect to z is the closed region not containing Z bounded by that circle of the coaxial family determined by the boundary of C and the null-circle Z which passes through the harmonic conjugate of z with respect to the intersections with the boundary of C of the circle through z of the conjugate coaxal family. This theorem is established for the special case Z = infinity. This is the most important special case, for if a set of points (weighted particles) in the plane is given, their center of gravity is easily found, as is a disc with the center of gravity as center containing the given points. Nevertheless some attention is devoted to the special case of this theorem when Z is the center of a disc whose closed exterior is C. Most of the conclusions deal with lemniscates and curves of higher degree. (Author)

AD-428 346 Div. 15
OTS price $1.60

Minnesota U., Minneapolis.
ON THE CONFORMAL TYPES OF ALBEGRAIC SURFACES OF EUCLIDEAN SPACE,
by Adriano M. Garsia. 1963, 18p.
Contract AF49 638 857
AFOSR 3243 Unclassified report

Descriptors: (*Conformal mapping, Complex variables), Algebraic topology.

It is shown that every compact Riemann surface has a conformally equivalent model among the real algebraic surfaces of Euclidean space. (Author)

AD-428 352 Div. 15
OTS price $3.60

Miami U., Coral Gables, Fla.
TOPOLOGICAL SPACES WITH LESS THAN HAUSDORFF SEPARATION,
by Andrew Sobczyk. July 62, 34p.
Contract AF49 638 1055
AFOSR 3249 Unclassified report

Descriptors: (*Topology, Analysis), Rings, Functions, Algebra.

AD-428 404 Div. 15
OTS price $1.60

Aarhus U. (Denmark).
ON A GENERALIZATION OF THE FINITE ARCSINE LAW,
by Glen Baxter. 1962, 12p.
Contract AF61 052 42
AFOSR 2877 Unclassified report

In cooperation with Minnesota U., Minneapolis.

Descriptors: (*Statistical functions, Differential equations), Stochastic processes, Difference equations, Polynomials, Probability.

A generalization of the arcsine law for infinitely divisible stochastic processes is found. The generalization method consists of finding a pair of differential equations for the generating functions of quantities like those in the distribution of N which is the number of positive partial sums considered. These equations are solved and the generating functions inverted. The sequence X consists of independent, identically distributed random variables with continuous and symmetric distributions; the probability that two of the partial sums are equal is zero.

AD-428 409 Div. 15
OTS price $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
ON FINITE GROUPS WITH AN ABELIAN SYLOW GROUP,
by Richard Brauer and Henry S. Leonard, Jr.
1959, 27p.
Contract AF49 638 227
AFOSR 3610 Unclassified report

Descriptors: (*Algebras, Groups (Mathematics)).

Consideration is given finite groups G of order g which satisfy the following condition: There exists a prime p dividing g such that if P is not equal to zero, is an element of a p-Sylow group P of G then the centralizer C(P) of P in G coincides with the centralizer C(P) of P in G. P is abelian.

AD-428 410 Div. 15
OTS price $2.60

Missouri U., Columbia.
ORBIT FAMILIES OF CONTINUOUS FLOWS,
by N. E. Foland. 1942, 27p.
Contract AF49 638 754
AFOSR 2795 Unclassified report

Descriptors: (*Topology, Conformal mapping), Equations, Theory, Numerical analysis.

AD-428 455 Div. 15
OTS price $1.10

Dartmouth Coll., Hanover, N. H.
(No title).
Final technical rept., 1 Oct 62-30 Sep 63.
Nov 63, 6p.
Grant AFOSR126 63
AFOSR J1351 Unclassified report

Descriptors: (*Algebras, Research program administration), Probability.

A brief description of the research to be done under this contract by the participating members is given. No technical information is contained in the document.

AD-428 502 Div. 15, 8, 30
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SYNTHESIS OF SYSTEMS TO ACCOMPLISH OPTIMUM FILTRATION,
by A. A. Gorskiy. 16 Dec 63, 19p.
FTD TT63 1108 Unclassified report

Trans. from Izvestiya An SSSR, OTN, Tekhnicheskaya Kibernetika, no. 1, pp. 42-50, 1963.

Descriptors: (*Operators (Mathematics), Functions), (*Noise, Linear systems), Numerical analysis, Difference equations, Inequalities, Series, Differential equations.

Consideration is given to the question of determining the characteristics of a linear stationary system which is optimum with respect to random effects. A compensating loop in the system must satisfy the additional condition that the difference of the highest degrees of the numerator and denominator in its generalized transfer functions not exceed some reference number. (Author)

AD-428 570 Div. 15
OTS price $4.60

Stanford U., Calif.
GLOBAL PROPERTIES OF MINIMAL SURFACES IN E3 AND En,
by Robert Osserman. 1 Oct 63, 42p. Technical rept. no. 23
Grant DA ARO D31 124G80
ARO 1323 28 Unclassified report

Descriptors: (*Topology, Theory), (*Surfaces, Numerical analysis), Green's function, Complex variables, Conformal mapping, Harmonic analysis, Transformations (Mathematics).

A minimal surface is the surface of least area bounded by a given closed curve. In three dimensional space these surface are realized, for reasonably simple curves, by soap films spanning wire loops. This paper obtains results related to the theorem that the normals to a complete minimal surface, not a plane, are everywhere dense. Examples: 1. The same theorem holds for two-dimensional surfaces in Euclidean spaces of dimension three or more. 2. Theorems connecting total curvature, Euler characteristic, and number of boundary components. 3. Theorems about the normals and tangent planes to minimal surfaces, including the capacity of the set of directions omitted. (Author)

AD-428 572 Div. 15
OTS price $6.60

Maryland U., College Park.
SELF-ADJOINT DIFFERENTIAL OPERATORS OF THE PURE WAVE TYPE,
by John Edward Lagnese. 1963, 60p.
Contract DA36 034ORD1486
AROD 407 63 Unclassified report

Doctoral thesis.

Descriptors: (*Partial differential equations, Operators), Taylor's series.

AD-428 685 Div. 15
OTS price $3.60

Institute of Research, Lehigh U., Bethlehem, Pa.
VECTOR FIELDS AND INFINITESIMAL TRANSFORMATIONS ON RIEMANNIAN MANIFOLDS WITH BOUNDARY,
by Chuan-Chih Hsiung. 1963, 36p.
Grant AF AFOSR62 206
AFOSR 4783 Unclassified report

Descriptors: (*Vector analysis, Transformations (Mathematics)), Algebraic topology, Tensor analysis, Differential equations, Field theory, Algebras.

Results of studies made of vector fields or infinitesimal transformations on compact Riemannian manifolds without boundary are extended to Riemannian manifolds with boundary. Fundamental formulas for Lie derivatives are given and the infinitesimal transformations and their generating vector fields are defined in terms of Lie derivatives. Necessary and sufficient conditions for a vector field on a manifold with zero tangential or normal component on a boundary to be a killing vector field are given. Conditions are obtained for the nonexistence of a nonzero conformal killing vector field on a manifold with zero tangential or normal component on the boundary, and necessary and sufficient conditions for a vector field on a manifold with zero tangential or normal component on the boundary to be a conformal killing vector field are obtained. It is shown that if the manifold has constant scalar curvature and admits a certain special infinitesimal nonhomothetic conformal motion leaving the boundary invariant, then the curvature is greater than zero. On a compact orientible Einstein manifold with the same boundary and curvature greater than zero, those special infinitesimal nonhomothetic conformal motions leaving the boundary invariant form a Lie algebra; a decomposition of this algebra with interrelations between its subalgebras is also obtained.

AD-428 782 Div. 15
OTS price $1.60

Adelphi Coll., Garden City, N. Y.
POINTWISE AND NORM CONVERGENCE OF DISTRIBUTIONS,
by Edward J. Beltrami. Dec 63, 16p. Rept. no. 110
Contract Nonr3360 01 Proj. NR041 252
Unclassified report

Descriptors: (*Statistical distributions, Potential theory), Sequences, Functions, Topology, Integrals, Inequalities, Measure theory.

Some results are derived concerning the relation between ordinary pointwise convergence, convergence in the sense of Schwartz distributions (weak convergence), and norm convergence of locally integrable functions by exploiting the notion of analytic continuation for distributions

which was recently investigated by H. J. Bremermann and L. Durand III (Jour. Math. Phy. 1961). One of the results is that weak, normed, and almost everywhere pointwise convergence are the same for every dominated sequence provided a certain local equicontinuity in the mean condition is satisfied. A partial converse to this result, showing that norm convergence must imply the local equicontinuity condition and dominance as well as pointwise convergence for some subsequence, is also established. (Author)

AD-428 852 Div. 15
OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
THE USE OF THE HYPERGEOMETRIC FUNCTION AS PART OF BAYESIAN ESTIMATION IN A TWO STATE MARKOV PROCESS,
by Edward A. Silver. Jan 64, 15p. Technical note no. 2
Contract Nonr1841 87
Unclassified report

Report on research in the Control of Complex Systems.

Descriptors: (*Probability, Special functions), Statistical processes, Game theory.

A special case of Bayesian estimation in Markov processes is considered. We consider a two state process where one transition probability is known exactly, while the other is assumed Beta distributed. Under these conditions the expected values of the steady state probabilities are obtained through the use of the hypergeometric function, a mathematical function heretofore encountered only in an entirely different area of applied mathematics. Knowing the expected values of the steady state probabilities enables us to place the process considered into a statistical decision framework. (Author)

AD-428 924 Div. 15
OTS price $9.10

David, Taylor, Model Basin, Washington, D. C.
THE CONVERGING FACTOR FOR THE EXPONENTIAL INTEGRAL,
by Francis D. Murnaghan and John W. Wrench, Jr.
Jan 63, 103p.
Proj. S R003 02 01, Task 0001
DTMB 1535 Unclassified report

Descriptors: (*Series, Tables), (*Integrals, Factor analysis), Differential equations.

The term 'converging factor,' is generally defined as the factor by which the final term of a truncated series must be multiplied to yield the remainder of the series. In this report the converging factor associated with the asymptotic series for the exponential integral Ei(x) of both positive and negative real argument x is discussed in detail, and numerical values therof for integral arguments are tabulated to 45 or more decimal places. Auxiliary tables are presented to permit the evaluation of this factor to comparable accuracy for intermediate values of the argument. Asymptotic series for the converging factor are rigorously developed, and the exact (rational) values of the first 21 coefficients are presented. As a byproduct, the first 20 nontrivial coefficients of Stirling's asymptotic series for the factorial function are deduced. A method for evaluating the exponential integral is presented in detail, and original tables of values of the exponential integral are given to 44 significant figures for integral values of x extending from 5 through 20 and to 50 decimal places for integral values of x ranging from -5 to -20, inclusive. (Author)

AD-429 065 Div. 15
OTS price $2.60

Columbia U., New York.
PRIORITY QUEUES,
by Lajos Takacs. 3 Oct 63, 22p. Rept. no. 38 63Nonr266 33 MS
Contract Nonr26659, Proj. 042 205
Unclassified report

Descriptors: (*Queueing theory, Integral transforms), Statistical analysis, Statistical process, Statistical distribution, Stochastic processes.

Customers of different priorities are arriving at a counter in accordance with a Poisson process. The customers are served by a single server in order of priority and for each priority in order of arrival. Two cases are considered: (1) service with privileged interruptions, and (2) service without interruption. It is supposed that the service times are mutually independent random variables having a prescribed distribution for each priority and independent of the arrival times. In both cases, a simple method is given for finding the Laplace-Stieltjes transform and the moments of the stationary distribution of the waiting time for each priority level. (Author)

AD-429 255 Div. 15
OTS price $1.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
RESEARCH IN MATHEMATICAL PROBLEMS.
Final rept., 1 Nov 62-31 Oct 63.
31 Oct 63, 7p.
Grant AF AFOSR62 108
AFOSR J1515 Unclassified report

Descriptors: (*Mathematical analysis, Research program administration), Differential equations, Partial differential equations, Special functions, Real variables, Boundary value problems, Transformations (Mathematics), Diffraction, Electromagnetic waves.

Brief abstracts are given of reports dealing with differential equations, partial differential equations, and special functions. Some of the reports are completed and some are in process; they are entitled: Alternative representations for nonself-adjoint boundary value problems; An atypical problem for linear ordinary differential equations; Instability intervals of Hill's equation; Generalized eigenvectors and separation of variables; Generalized limiting amplitude principle; and Analysis of the Watson Transformation.

16. MEDICAL SCIENCES

AD-427 905 Div. 16
OTS price $1.10

Harvard U., Cambridge, Mass.
NUTRITION AND CIRRHOSIS OF THE LIVER,
Rept for 1 Jan 63-21 Jan 64,
by G. Kenneth Mallory and Richard A. MacDonald.
21 Jan 64, 2p.
Contract DA49 007md863
Unclassified report

Descriptors: (*Liver, Cells (Biology)), (*Cells (Biology), Regeneration), Rats, Biliary system, Radioactive isotopes, Autoradiography, Mitosis.

Studies were made of the regenerative response of liver cells following acute obstruction of the common bile duct of the rat. Parabiotic rats were prepared to determine whether in animals joined in parabiosis the stimulus to liver cell proliferation could be transmitted from a rat with biliary obstruction to its nonoperated partner, and whether regenerative and other changes in the liver of a rat with bile duct obstruction would be modified through parabiotic union with a normal rat. Thymidine-H3 and autoradiographs were used to detect and quantitate nuclei synthesizing deoxyribonucleic acid. Common duct obstruction in a rat joined to a normal rat resulted in less liver degeneration and necrosis, less liver cell proliferation, and less elevation of the total serum bilirubin than in single rats with obstruction. The nonoperated partner exhibited slight elevation of serum bilirubin, no consistent change in hepatic thymidine-H3 uptake, and no change in hepatic cell mitosis. It was considered probable that liver cell proliferation following common bile duct obstruction was due to damage to liver cells by mechanical factors, together with the effects of retention of bilirubin and/or other components of bile. This effect was not transmissible between parabiotic animals. (Author)

AD-427 993 Div. 16
OTS price $3.60

Linde Co., Div. of Union Carbide Corp.,
Tonawanda, N. Y.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. XIV BIOLOGICAL STUDIES IN ANIMALS OF THE PROPERTIES AND FUNCTIONALITY OF RAPIDLY FROZEN BLOOD AND ERYTHROCYTES.
Progress rept., June 62-July 63,
by A. P. Rinfret. 30 Nov 63, 35p.
Contract Nonr3003 00
Unclassified report

Descriptors: (*Blood, Low temperature research), (*Erythrocytes, Low temperature research), Freezing, Storage, Rabbits, Lactose, Glucose, Oxygen, Viability, Survival, Iodine, Tracer studies, Radioactive isotopes.

This report describes basic and applied research conducted to evaluate in rabbits the functionality and physiological safety of rapidly frozen and thawed blood and red cells. In addition,

final results are reported for long term frozen storage experiments with rabbit blood protected by lactose and multiple transfusion studies of the immunohematologic properties of rapidly frozen rabbit blood protected by lactose-glucose. (Author)

AD-427 998 Div. 16
OTS price $2.75

Maryland U. School of Medicine, Baltimore.
CLINICAL SHOCK; A STUDY OF THE BIOCHEMICAL RESPONSE TO INJURY IN MAN.
Annual progress rept. 1 Jan-31 Dec 63,
by R. Adams Crowley. 31 Dec 63, 1v.
Contract DA49 193MD2229
Unclassified report

Descriptors: (*Shock (Pathology), Therapy), Hemorrhage, Cardiovascular system, Ammonia, Metabolism, Hypothermia, Hypoxia, Physiology, Wounds and injuries, Blood coagulation, Enzymes, Enterobacteriacea, Immunology, Toxins and antitoxins, Bacteria.

Traumatic shock is associated usually with severe injury and characterized principally by inability to maintain an adequate circulation. This study focuses on the total problem - the reaction of

the body to injury, maintenance of life, and repair of injury. Studies currently in progress and those proposed are aimed primarily to understanding the biochemical response to injury in man. Provisions have been made for careful metabolic studies in the shocked patient without interfering with obvious life saving measures. Such extensive studies have required the assembly of a considerable staff - professional and technical - to support a C.S.U. on a 24-hour basis. Experimental problems relevent to establishment of such a unit evolved from two major factors: (1) original nature of the study (a scientific study of shock in man); and (2) an unprecedented design of this study. Solutions to these problems are described. Since inception of the contract January, 1962, some 200 patients have been studied as they have undergone recussitation measures. Final organization of the unit now permits more complex studies into the physio-biochemical response to injury in man. (Author)

AD-428 048 Div. 16
OTS price $1.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
LACK OF PREDICTABILITY IN RATS TO EXHIBIT CHRONIC OXYGEN POISONING,
by G. H.Kydd, L. Kowalski, and R. McGowan.
30 Dec 63, 8p.
NADC MA 6324 Unclassified report

Descriptors: (*Oxygen, Poisoning), Toxicity, Paralysis, Rats, Pressure.

Sprague-Dawley descended rats were repeatedly exposed to oxygen at high pressure. Chronic oxygen toxicity was obtained in one group of animals while in two other groups no permanent paralysis was obtained. It is suggested that a third factor, perhaps environmental, may have a role in predisposing rats to the development of the chronic signs of oxygen toxicity. The relationship of chronic to acute signs is discussed. (Author)

AD-428 100 Div. 16
OTS price $3.60

Federation of American Societies for Experimental Biology, Washington, D. C.
A STUDY OF THE BIOMEDICAL PROBLEMS RELATED TO THE REQUIREMENTS OF TROOPS AT TERRESTRIAL ALTITUDES OF 10,000 FEET OR ABOVE,
by Wendell H. Griffith and Allan L. Forbes.
15 Oct 63, 20p.
Contract DA49 092AR09
Unclassified report

Descriptors: (*Military personnel, High altitude), Medicine, Acclimatization, Environmental tests, Oxygen, Physiology, Respiration, Mountains, Hypoxia, Physical fitness.

The biomedical importance of mountain sickness is presented. Exposure to the decreased oxygen tension of high altitudes results in physiological adjustments which are associated with pulmonary hyperventilation. This response of the body aids in maintaining an adequate alveolar concentration of oxygen but it also results in the removal of carbon dioxide at an excessive rate. Consequently, the sequelae of altitude hypoxia include a gamut of imbalances due to changes in concentration of numerous blood and tissue components. The severity of mountain sickness increases with the elevation and varies according to individual differences in the rates of adjustment to the new environment. Although energy requirements for the same physical work are similar in a hypoxic environment and at sea level, the magnitude of the requirement for operational performance is much greater at high elevations because of the effort involved in movements in a mountainous terrain, especially for activity that is necessary despite wind, cold, and cumbersome garments and equipment. Thus, the difficulty in supplying oxygen to tissues is exaggerated. Exertion above 20,000 feet results in deterioration which is difficult to prevent except by recuperation at lower elevations. A supply of oxygen is essential for medical care, especially for the treatment of pulmonary edema. (Author)

AD-428 119 Div. 16, 25
OTS price $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
A THEORY OF ION TRANSPORT ACROSS CELL SURFACES BY A PROCESS ANALOGOUS TO ELECTRON TRANSPORT ACCROSS LIQUID-SOLID INTERFACES,
by Freeman W. Cope. 6 Dec 63, 16p.
NADC MA6325; NAVMED MR005 13 0002 7 24
Unclassified report

Descriptors: (*Transport properties, Ions), (*Kinetic theory, Permeability), Membranes (Biology), Physiology, Electrons, Cells (Biology), Biophysics, Solid state physics, Sodium, Potassium, Calcium, Kidneys, Muscles, Tissues (Biology).

A kinetic theory of ion transport across cell surfaces was developed in a form analogous to the kinetic theory of electron transport across solid-liquid interfaces of biological particles. The ionic theory is based on the observation that, at least in one instance, the voltage-current behavior for ion conduction across a cell surface is describable by the Tafel equation, in analogy to the conduction of electrons across solid-liquid interfaces. The theory predicts that the kinetics of ion transport across cell surfaces will conform to the Elovich rate equation, which is shown to be true for various experimental data. (Author)

AD-428 176 Div. 16
OTS price $1.60

George Washington U., Washington, D. C.
STUDY OF PLATELETS.
Annual progress rept., 1 Apr 62-15 Dec 63,
by Jack J. Rheingold, Edward Adelson and Arnold A. Lear. 15 Dec 63, 8p.
Contract DA49 193MD2273
Unclassified report

Descriptors: (*Blood platelets, Life span), Coagulation, Tracer studies, Survival, Heparin, Physiology, Hemoglobin, Storage.

AD-428 192 Div. 16
OTS price $3.60

Biotechnology Lab., U. of Calif., Los Angeles.
UPPER EXTREMITY PROSTHETICS RESEARCH. HUMAN TRACKING. SENSORY MOTOR CONTROL. MYOELECTRIC CONTROL STUDIES.
Progress rept.
15 Sep 63, 32p. ED rept. 63 57
Contracts V1005M2075, N123 60530 23558A
Unclassified report

Descriptors: (*Prosthetics, Extremities), (*Motor reactions, Tracking), Control, Body, Visual acuity, Magnetic tape, Errors, Computers, Performance tests, Pneumatic systems, Transducers.

Contents: Upper Extremity Prosthetics Research; Research on the Performance of Human Operators of Tracking Systems; Research on Sensory-Motor Control; and Myoelectric Control Studies.

AD-428 200 Div. 16
OTS price $3.60

Harry Diamond Labs., Washington, D. C.
ENGINEERING ANALYSIS OF THE MODEL 1 ARMY ARTIFICIAL HEART PUMP,
by James W. Joyce, Jr. 27 Dec 63, 36p.
Proj. HDL31000
HDL TR1191 Unclassified report

Descriptors: (*Mechanical organs, Heart), (*Heart, Models (Simulations)), Effectiveness, Mechanical engineering, Design, Tests, Pressure, Pumps, Control systems, Pulse amplifiers, Medical research, Army.

An engineering analysis was made of the performance capabilities of the Model 1 Army Artificial Heart Pump. The pump was shown to be load sensitive in about the same way as the human heart is; its output varies directly with filling pressure and inversely with outflow resistance. In addition, pump output was shown to vary directly with input air pressures and with the magnitude of suction developed around the ventricle. The analysis demonstrated that the controls on the pump could be used to achieve a variety of output pulse shapes. Of the two types of ventricles employed, the more pliant one produced higher flow rates under given operating conditions, although the corresponding pulsing frequencies were lower than for the stiff ventricle. The pump was designed to simulate the human heart functionally. This analysis shows that the pump generally satisfies the predicated requirements, but it remains for further medical evaluations to confirm the basis of the pump design. (Author)

AD-428 211 Div. 16
OTS price $4.60

Linde Co., Div. of Union Carbide Corp., Tonawanda, N. Y.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. XVII. FREEZE THAW DAMAGE AS A FUNCTION OF CELL AGE USING Fe SUB 59 LABELED HUMAN AND RABBIT ERYTHROCYTES.
Progress rept.,
by A. P. Rinfret. 16 Jan 64, 38p.
Contract Nonr300300
Unclassified report

Descriptors: (*Low temperature research, Blood), (*Blood, Preservation), Freezing, Labeled substances, Aging (Physiology), Erythyrocytes, Radioactive isotopes, Rabbits, Man, Iron, Hemolysis, Damage.

The relationship between in vivo erythrocyte age and susceptibility to freeze-thaw damage was studied using radioactive iron-59. This isotope is used to label selectively the young erythrocyte population as the cells are being released into circulation by the bone marrow. These studies, carried out with both human and rabbit blood, were designed to determine whether hemolysis occurring as a result of freeze-thaw damage is greater in the older cells which are destined to be removed from circulation or smaller in the younger erythrocytes. The results show that young erythrocytes are in general more resistant to freeze-thaw injury than are the older segments of the population, indicating that there is a definite relation between freeze-thaw damage and in vivo cell age. (Author)

AD-428 239 Div. 16
OTS price $3.60

Marseilles U. (France).
EVOKED VISUALS RESPONSES IN MAN DURING AUDITORY STRESS,
by H. J. Gastaut. 30 Oct 63, 26p.
Grant AF EOAR62 74
AFOSR 64 0018 Unclassified report

Descriptors: (*Stress (Physiology), Vision), (*Vision, Conditioned reflex), (*Visual signals, Stimulation), Man, Audiometry, Sound, Hearing, Electroencephalography, Reticuloendothelial system, Psychometrics, Threshold (Physiology).

A transcranial study in man of evoked visual responses due to intermittent light stimulation during silence or intense prolonged auditory stimulation. These responses were recorded with conventional E.E.G. as photic driving, or with an apparatus of integration (the phasotron of Remond) as an average evoked potential. They are increased at the start of sound stimulation and diminished during its continuation. If due account is taken of the corresponding modifications of the fundamental E.E.G. rhythms, one may consider these phenomena as being due to activation with subsequent inhibition of the reticular formation. This would equally explain the psychometric changes, and the lowering of efficiency and of personnel security observed during stress by sound. (Author)

AD-428 246 Div. 16
OTS price $7.60

Harvard U. Medical School, Boston, Mass.
PHYSIOLOGICAL EFFECTS OF PAINFUL STIMULATION DURING HYPNOTIC ANALGESIA,
by Ronald E. Shor. 1962, 1v.
Unclassified report

Descriptors: (*Pain, Stimulation), (*Stimulation, Physiology), Thresholds (Physiology), Psychiatry, Diagnosis, Sleep, Anxiety, Analgesics and antipyretics.

AD-428 353 Div. 16, 30
OTS price $1.10

Philco Research Labs., Newport Beach, Calif.
APPLICABILITY OF OLFACTORY TRANSDUCERS TO THE DETECTION OF HUMAN BEINGS.
Quarterly status rept. no. 1, 1 Nov-31 Dec 63,
by H. A. Ells. 31 Dec 63, 5p.
Contract N600 61444
Unclassified report

Descriptors: (*Nerves, Antennas), (*Diptera, Nervous system), Detection, Man, Thresholds (Physiology), Molecules.

This program was undertaken with the general objective of assessing the applicability of biological olfactory transducers, specifically the antennae and antennal nerves of the fly, to the detection of airborne molecules emanating from human beings and their associated equipment. The specific transducer proposed was the olfactory organ of the common fly. The immediate goals are to devise methods for detecting action potentials from the olfactory organ, construct apparatus for introducing known concentrations of volatile compounds to the olfactory organ, establish threshold levels for the detection of isovaleraldehyde (as a standard) and odorous or volatile compounds which might be associated with or produced by human beings or their equipment, and to test the longevity of biological preparations as they relate to possible field use. (Author)

AD-428 355 Div. 16
OTS price $1.60

Wayne State U. Coll. of Medicine, Detroit, Mich.
ISOLATION AND CLASSIFICATION OF CYTOPATHOGENIC AGENTS FROM PATIENTS WITH HEPATITIS AND INFECTIOUS MONONUCLEOSIS.
Annual progress rept., Mar 62-Jan 63,
by E. E. Muirhead and Helene Schneider. Jan 63, 12p.
Contract DA49 007md908
Unclassified report

Descriptors: (*Hepatitis (Nonviral), Microorganisms), (*Blood, Diseases), (*Liver, Diseases), Blood cells, Leukocytes, Sensitivity, Blood serum, Enzymes, Rabbits, Man, Purification.

AD-428 381 Div. 16
OTS price $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
THE NON-PROTEIN AMINO ACIDS AND RELATED COMPOUNDS OF RAT LIVER MITOCHONDRIA,
by Herman W. Shmukler and B. David Polis.
18 Oct 63, 19p.
NADC MA 6318; NAVMED MR005 13 0002 7 21
Unclassified report

Descriptors: (*Liver, Amino acids), (*Amino acids, Chromatographic analysis), Ion exchange, Peptides, Rats, Proteins, Distribution.

The non-protein amino acids and related compounds of rat liver mitochondria have been analyzed by automatic ion exchange chromatography. Twenty-seven ninhydrin positive peaks were obtained. The identity of these chromatographic peaks is discussed. Mitochondria frozen at -20 degrees for 24 hours showed no change in the free amino acid composition; however, a fourfold increase in the free peptide content was observed. Storage of fresh mitochondria at 0 degrees for 6 days resulted in a sevenfold increase in the free amino acid content with a fifteenfold increase in the free peptide content. (Author)

AD-428 400 Div. 16
OTS price $1.60

Brussels U. (Belgium).
GENETIC REPLICATION AND MACROMOLECULAR SYNTHESES IN TEMPERATE BACTERIOPHAGES.
Final technical rept.,
by R. Thomas. 30 Sep 63, 14p.
Grant AF EOAR62 17
AFOSR J1374 Unclassified report

Descriptors: (*Genetics, Microorganisms), (*Microorganisms, Genetics), Bacteriophages, Synthesis, Mutations, Proteins, Immunity, Analysis.

Superinfection experiments using chloramphenicol, or shift down to block protein syntheses, show that the early syntheses are not mutant-specific nor even species-specific. A number of conditional defective (suppressor sensitive, sus) mutants of lambda have been isolated and partly characterized by functional and recombinational analysis. The final purpose is to identify the genes involved in the early functions. Mixed superinfections of lambda-lysogenic cells with (a) a heteroimmune (434 hy) or strong virulent (lambda v) phage and (b) a normal lambda show that the control of genetic replication does not entirely depend on the repression of early protein syntheses. The genetic segment involved in lysogenization in phage 434 hy has been analysed and compared with the corresponding region in lambda. The genetic segments involved in the two aspects of immunity cannot be separated from each other or crossed between lambda and 434 hy. After superinfection of a lysogenic bacterium with a heteroimmune phage the progeny contains very few particles with genetic markers from the prophage. A high percent of them are partially diploid, being heterozygous for at least three loci. (Author)

AD-428 402 Div. 16
OTS price $1.60

Pennsylvania U. School of Medicine, Philadelphia.
NEUROHUMORAL CONTROL OF THE PITUITARY.
Final rept., 1 Aug 62-31 July 63,
by Samuel McDonald McCann. 4 Dec 63, 6p.
Grant AF AFOSR62 133
AFOSR J1373 Unclassified report

Descriptors: (*Pituitary gland, Physiology), Endocrine gland, Secretion, Adrenocorticotropic hormone, Dogs.

The objective of this work has been to clarify the hypothalamoanterior hypophysial interrelationship. Work has been done in two areas: (1) regulation of ACTH secretion, and (2) regulation of the secretion of gonadotrophins. (Author)

AD-428 600 Div. 16, 30
OTS price $7.60

System Development Corp., Santa Monica, Calif.
METHODS OF THE MANUAL ANALYSIS OF MULTISOURCE, CONTINUOUSLY RECORDED BIOMEDICAL DATA,
by J. Wilson Nance. 30 June 63, 100p. Rept. no. TM1210 000 01
Contract AF19 628 1648
Unclassified report

Descriptors: (*Medicine, Analysis), (*Digital computers, Diagnosis), Feasibility studies, Test methods, Computer logic, Electrocardiography, Ballistocardiography, Electroencephalography, Galvanic skin response, Measurement, Physiology, Tables, Pathology.

This document is the first in a series that attemps to determine the feasibility of applying electronic digital computers to the screening and analysis of biomedical data by examining as closely as possible the analytic logic employed by the clinical diagnostician. In many cases it has been necessary to avoid specific values, limits, and magnitudes since these factors are determined entirely by the equipment used by the investigator as well as the method employed in the use of the equipment. Specific normals needed for the preparation and operation of programs would have to be determined for the specific case at hand. The following classifications of physiological measurement and their related manual analysis methods included in this report are: electrocardiograph, ballistocardiograph, phonocardiograph, electroencephalograph, electro-oculograph, pneumograph, and galvanic skin response. The report states that the preparation of suitable computer programs to aid the clinical diagnostician requires a basic knowledge of the methods used in the analysis of biomedical data. It condenses the available information on the analysis methods and techniques and provides the programmer with an outline of the manual methods utilized so that he may attempt further feasibility studies on the use of the computer in the screening and analysis of biomedical data. (Author)

AD-428 612 Div. 16, 32
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
REPORT OF COOPERATIVE INVESTIGATION WITH THE AGRICULTURAL RESEARCH SERVICE FOR ADAPTING A METHOD FOR THE DETECTION AND MEASUREMENT OF FENAC IN IRRIGATION WATERS,
by E. T. Lyons, P. R. Tramutt and L. O. Timblin Jr. 2 Aug 63, 21p.
BR D LR CH106 Unclassified report

Descriptors: (*Water, Chromatographic analysis), (*Irrigation systems, Test methods), Biochemistry, Detection, Chemicals, Determination, Carboxylic acids, Aromatic compounds, Chlorine compounds, Measurement.

The data in this report show that it is possible to determine fenac (common chemical name for 2, 3, 6 trichlorophenylacetic acid 1/2/) in irrigation waters in concentrations as low as 20 ppb by the use of gas chromatographic techniques; the limit of detection alone is 10 ppb. This investigation has been successful in attaining its objective, but much remains to be done with regard to further investigation and development of this method. The results stated and the conclusions drawn in the report are based upon a minimum of data; this limitation is placed upon them. There are some features in the extraction of the acid from the water and in the preparation of the extract for the gas chromatographic analysis that need to be improved and further study may indicate more. The operating conditions required to obtain these results are such that the instrumental components are made to function at levels somewhat higher than those in normal usage. So far, however, there has been no operational malfunction due to this cause. Instruments of greater initial sensitivity would produce more precise data. (Author)

AD-428 664 Div. 16
OTS price $1.60

Army Biological Labs., Frederick, Md.
THE EFFECT OF AIR HUMIDITY ON THE VIABILITY OF MICROORGANISMS IN AN AEROSOL,
tr. by Charles T. Ostertag, Jr. June 63, 10p.
ABL T816 Unclassified report

Trans. from Microbiology (Soviet Journal), 31:2 (Reprint) pp. 350-356, 1962.

Descriptors: (*Microorganisms, Viability), (*Bacterial aerosols, Viability), Bacteria, Humidity, Stability.

A bacterial drop phase aerosol was produced in an experimental chamber with a 250 liter capacity. Staph. albus and Sarcina lutea, isolated from the air of a room, and Bact. coli and Bact. prodigiosum, isolated from water, were used as experimen-

tal models. The microorganisms Staph. albus and Sarcina lutea, which have adapted to the conditions of an air medium, are well preserved in a relative air humidity from 12 to 98% with small fluctuations of temperature within the limits of 18,5 to 21 degrees. These microorganisms are stable in the drop phase of a bacterial aerosol and are removed mainly due to sedimentation. The microorganisms Bact. coli and Bact. prodigiosum, which are isolated from water and which are not adapted to the conditions of an air medium are considerably less stable in an aerosol. They decay extremely rapidly in a relative air humidity lower than 50%, whereas at a higher humidity they preserve their viability very well. A relative air humidity higher than 70% is most favorable for the survival of Bact. coli and Bact. prodigiosum in a bacterial drop phase aerosol in a temperature between 18.5 and 21 degrees. (Author)

AD-428 665 Div. 16
OTS price $2.60

Naval Hospital, Oakland, Calif.
A NEW CONCEPT IN THE PRODUCTION OF ORTHOPAEDIC AND AMPUTEE TRACINGS.
Preliminary rept.
by Charles Asbelle. 24 June 63, 28p.
Proj. MR005 12 0400, Task 03
Unclassified report

Descriptors: (*Prosthetics, Legs), (*Artificial limbs, Construction), Design.

A preliminary report concerning the origination and results of initial investigations of a new technic for producing working patterns used in forming and constructing orthopaedic braces and artificial limbs. The process presents two singular features. First a mechanically-produced silhouette is substituted for conventional tracing methods. Second, the pattern is produced with the patient in a near-vertical position rather than the usual horizontal-supine position. (Author)

AD-428 666 Div. 16, 14
OTS price $1.10

Walter Reed Army Inst. of Research, Washington, D. C.
EVALUATION OF ISOFOAM PE 15 (QUICK RISE FORMULATION) AS A SPLINT MATERIAL,
by James Hill and Donald R. Ingenito. Dec 63, 4p.
Proj. 3A012501A802
WRAIR TR6319 Unclassified report

Descriptors: (*Isocyanate plastics, Medical supplies), (*Expanded plastics, Medical supplies), (*Medical supplies, Expanded plastics), Foams, Compressive properties, Deformation, Impact shock.

The bending, compressive, and impact strengths of the quick rise formulation are determined and compared to the regular PE 15 foams. The quick rise foams were superior in all properties tested. The quick rise foams reached a tack free state in 5-6 minutes compared to 15 minutes for the regular PE 15 foams. This quick rise formulation should be satisfactory for foam-in-place splints. (Author)

AD-428 667 Div. 16
OTS price $1.10

Naval Hospital, Oakland, Calif.
(No title).
Quarterly progress rept. Oct-Dec 63.
Dec 63, 4p.
Unclassified report

Descriptors: (*Prosthetics, Legs), Foams, Valves, Ventilation, Hydraulic systems, Amputees, Joints, Aluminum, Artificial limbs, Rubber.

This report presents Experimental and Developmental Activities in prosthetic research on a molded foam foot, an air exchange valve for ventilating amputation stump sockets, new concept in production of orthopaedic and amputee tracings a hydraulic brace former, forged aluminum below knee joints, a navy-fitch above-elbow artificial arm, the variable cadence knee mechanism, finish treatment for braces, and a simplified artificial leg. (Author)

AD-428 701 Div. 16
OTS price $1.60

Army Biological Labs., Frederick, Md.
PRESERVATION OF THE PROPERTIES OF THE HOGCHOLERA VIRUS IN VIRULENT DEFIBRINATED BLOOD TREATED WITH 0.3 PER CENT PHENOL AND BUFFERED AT 5.5 pH,
by I. Gheorghiv, T. Albu and I. Niteiu.
29 Apr. 63, 13p.
ABL T782 Unclassified report

Trans. from Lucarile Stiintifice (Scientific Proceedings), 4, pp. 193-201, 1960.

Descriptors: (*Hog cholera virus, Viability), Preservation, Blood, Buffers, Vaccines, Effectiveness, Immunity.

AD-428 702 Div. 16
OTS price $1.60

Army Biological Labs., Frederick, Md.
THE VITALITY OF CELL FRAGMENTS OF YEAST. IV THE RELATION OF THE NUCLEUS TO GROWTH ABILITY,
by O. Necas, tr. by Charles T. Ostertag, Jr.
June 63, 11p.
ABL T808 Unclassified report

Trans. from Folia Biologica, 2, pp. 29-35, 1956.

Descriptors: (*Cells (Biology), Physiology), Yeasts, Nuclei (Biology), Regeneration, Growth, Morphology (Biology).

AD-428 703 Div. 16
OTS price $1.10

Army Biological Labs., Frederick, Md.
METHODS FOR THE BACTERIOLOGICAL INVESTIGATIONS OF UPPER LAYERS OF THE ATMOSPHERE,
by Ya. G. Kishko, tr. by Charles T. Ostertag, Jr.
June 63, 5p.
ABL T814 Unclassified report

Paper presented at the All-Union Conference in the Institute General and Communal Hygiene, 26 May 58, Moscow. Trans. from Laboratornoye Delo, 5, pp. 37-39, 1959.

Descriptors: (*Bacteria, Upper atmosphere), Test equipment, Samplers, Collecting methods, Culture media.

AD-428 724 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF CATECHOLAMINES IN VARIOUS ORGANS OF DOGS UNDER CONDITIONS OF DEEP HYPOTHERMIA,
by Ye. P. Stepanyan, V. A. Bukharin and M. A. Chernyavskaya. 26 Dec 63, 11p.
FTD TT63 1096 Unclassified report

Trans. from Byulletin' Eksperimental'noy Biologii i Meditsingy, Nr. 9, pp. 56-60, 1963.

Descriptors: (*Phenols, Amines), (*Amines, Phenols), (*Hypothermia, Dogs), Hormones, Heart, Surgery, Blood, Tissues (Biology), Muscles, Adrenal glands, Cerebral cortex, Distribution.

AD-428 756 Div. 16
OTS price $2.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
PRIMARY, SECONDARY, AND CALORIC NYSTAGMUS OF THE CAT FOLLOWING HABITUATION TO ROTATION,
by William E. Collins. July 63, 19p.
CARI 63 13 Unclassified report

Descriptors: (*Eye, Motion), Cats, Physiology, Rotation, Thresholds (Physiology), Acceleration, Adaptation (Physiology), Ear, Stimulation, Analysis.

Ten cats were exposed to a series of above-threshold accelerations and sub-threshold deceleration. Unilateral caloric irrigations, provoking nystagmus in the same direction as the above-threshold rotational stimuli preceded and followed the set of accelerations. A marked adaptation of nystagmus, characterized by specific changes in early trials, resulted from repeated rotation. Although neither duration nor total slow-phase eye displacement to caloric stimulation was affected, the intervening rotational experience produced some reduction in the frequency of the nystagmic beats. Two factors were proposed in explanation for the minimal transfer of adaptation from the rotational to the caloric situation. Secondary nystagmus activity was also examined and appeared closely related to preceding primary reactions. The data indicate that clinical (caloric) responses to vestibular stimulation may not give an accurate indication of a subject's state of adaptation to practiced levels of angular accelaration. Such findings provide cautions in the establishment of appropriate testing techniques for the analysis of vestibular function in air-or space-vehicle crew members. (Author)

AD-428 757 Div. 16, 28
OTS price $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
A CENTRAL FACTOR IN PURE TONE AUDITORY FATIGUE,
by Joel S. Wernick and Jerry V. Tobias. Sep 63, 6p.
CARI 63 19 Unclassified report

Descriptors: (*Audiometry, Sensitivity), (*Hearing, Fatigue (Physiology)), Attention, Sound, Psychology, Physiology, Biochemistry, Sensory mechanisms, Stimulation.

A long accumulation of psychophysical and physiological evidence indicates that auditory fatigue has its locus of effect in the cochlea; transfer studies with negative or questionable results, and studies of cochlear chemistry and potentials with positive results all lead to the same conclusion. However, Galambos's reports of inhibition through efferent stimulation taken together with his findings of changes in cochlear potentials corresponding to differences in 'attentiveness' provide a basis for testing the existence of a central factor operative in auditory fatigue. The present study was designed to evaluate the possibility that a listener's level of mental activity constitutes an adequate central factor. Subjects were presented with a 4000 cps, 40 dB SL or 90 dB SL tone for 3 minutes under conditions of (a) a mental task or (b) reverie. Pre- and post-fatigue thresholds were measured with a switched (0.2 sec on, 0.2 sec off) tone. For low level (40 dB) fatigue the frequency of the test tone was 4000 cps and for high level (90 dB) fatigue, 5656 cps. Subjects consistently showed greater temporary threshold shift and longer recovery time when the fatiguing tone was presented in the mental task condition. Results thus indicate a central factor in pure tone auditory fatigue. It is suggested that the degree of effect of a fatiguing tone is a function of the listener's degree of mental activity during stimulation. (Author)

AD-428 781 Div. 16
OTS price $5.60

Naval Hospital, Oakland, Calif.
AN AIR-EXCHANGE VALVE FOR VENTILATING AMPUTATION STUMP SOCKETS.
Final rept.,
by Charles Asbelle. 1963, 47p.
Proj. 005 12 0400
Unclassified report

Descriptors: (*Prosthetics, Valves), Perspiration, Amputation stumps, Design, Construction, Effectiveness.

A final report of results of investigations with respect to the origination, design, construction, use and evaluation of a simple, inexpensive impulsion-type socket valve designed to promote aeration of enclosed amputation stumps and other enclosed tissues to significantly reduce the problems of sweat. (Author)

AD-428 811 Div. 16
OTS price $2.60

Air Force Weapons Lab., Kirtland Air Force Base, N. Mex.
COMPARISON OF MORTALITY OF RATS FOLLOWING PARTIAL AND WHOLE-BODY EXPOSURE TO 250 KVP X-RAYS,
by Ronald E. Engel. Jan 64, 17p.
AF Proj. 7801 Task 780105
RTD TDR63 3011 Unclassified report

Descriptors: (*Radiation effects, Rats), Whole body irradiation, Partial body irradiation, Survival, Body weight, Radiological dosage, X-rays, Radiobiology.

Forty-one adult rats were exposed to 3,000 r (MAD) regional irradiation from a 250-kvp source. Regional irradiation consisted of whole-body, head-shielded, and head-only, utilizing a specially built restraining apparatus for partial body irradiation. Rats exposed to the whole-body and head-shielded irradiation died at an average of 3.8 and 4.0 days post-exposure respectively. Rats exposed to the head-only irradiation died at an average of 15 days post-exposure; this group exhibited the largest weight loss of all irradiated groups. (Author)

AD-428 835 Div. 16
OTS price $1.60

Walter Reed Army Inst. of Research, Washington, D. C.
EVALUATION OF VO HOOKS FOR HOOK FORCE RATIOS.
by John W. Hodge, Jr. Dec 63, 10p.
Proj. 3A012501A802
WRAIR TR6318 Unclassified report

Descriptors: (*Prosthetics, Hooks). Analysis, Effectiveness.

The pinch force and operating cable force characteristics of three dorrance hooks and two 2-load hooks were evaluated. The force levels were observed with a varying number of rubber bands on the dorrance hooks, and the two load settings on the 2-load hooks. Finally, the operating cable force to pinch force ratios were determined for the hooks. The small dorrance hook (Model 10X) exhibited the best hook force ratio of the hooks evaluated. This ratio was 1.23 to 1 pounds of cable force per pound of pinch. (Author)

AD-428 855 Div. 16
OTS price $1.60

Naval Hospital, Philadelphia, Pa.
INDIRECT BASOPHIL DEGRANULATION TEST IN PENICILLIN ALLERGY,
by Harry I. Katz, Kenneth A. Gill, Donald L. Baxter and Samuel L. Moschella. 1963, 14p.
NAVMED MR00 512 1406
Unclassified report

Descriptors: (*Penicillins, Allergy), (*Drugs, Sensitivity), Blood cells, Therapy.

This report is a review of the more recent developments in the field of penicillin hypersensitivity. The results are based on the indirect basophil degranulation test on subjects with a history of untoward reactions following penicillin therapy will be presented. (Author)

AD-428 950 Div. 16
OTS price $3.60

Johns Hopkins U., School of Hygiene and Public Health, Baltimore, Md.
SEQUENTIAL IMMUNIZATION PROCEDURE AGAINST GROUP B ARBOVIRUSES.
Annual progress rept., 1 Feb 63-1 Feb 64,
by Winston H. Price. 1 Feb 64, 1v.
Contract DA49 193md2398
Unclassified report

Descriptors: (*Encephalitis virus, Immunity), Antigens & antibodies, Viruses, Sensitivity, Primates, Neurology, Pathology.

A strain of Japanese B encephalitis virus has been partially attenuated in its virulence for rhesus monkeys by chick embryo passage. This partially attenuated strain gives excellent protection in monkeys against challenge of virulent Japanese B virus using lowering of viremia and absence of neuropathology as criteria of protection. It also protects against St. Louis encephalitis virus. A combination of 17D yellow fever vaccine plus dengue 4 virus gives protection in monkeys against a challenge of dengue 1 virus. The subcutaneous or oral administration of Langat virus to spider monkeys protects them against challenges by Russian spring summer encephalitis virus or Omsk hemorraghic fever virus. This protection lasts at least 22 months. Data from various types of experiments indicate that two basic mechanisms are important in conferring protection in the sequential immunization procedure. One requires the initial presence of circulating neutralizing antibody. The second mechanism depends on the sensitization of the immune mechanisms of the host by the virus vaccines so that in the absence of detectable neutralizing antibody the host responds with an anamnestic response in neutralizing antibody when challenged by heterologous group B viruses. It is this latter mechanism that appears to be important in long lasting immunity. (Author)

AD-428 959 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CARBON DIOXIDE ASSIMILATION BY HETEROTROPHIC BACTERIA AND ITS SIGNIFICANCE IN THE ASSAY OF CHEMOSYNTHESIS IN RESERVOIRS,
by T. V. Zharova. 6 Jan 64, 15p.
FTD TT63 1106 Unclassified report

Trans. from Mikrobiologiya (Russian), Vol. 32, Nr. 5, pp. 843-849, 1963.

Descriptors: (*Microorganisms, Metabolism), (*Metabolism, Microorganism), Synthesis, Carbon dioxide, Bacteria, Carbon, Chemistry, Biological assay.

AD-428 966 Div. 16
OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
THE WOLFF-PARKINSON-WHITE SYNDROME AS AN AVIATION RISK,
by Raphael F. Smith. 28 May 63, 13p.
NAVMED MR005 13 7004 15 Unclassified report

Descriptors: (*Arrhythmia, Aviation medicine), Electrocardiography, Survival, Pilots, Heart, Diseases, Statistical data.

The prevalence of the W-P-W anomaly, the prevalence of tachycardia in the W-P-W group, and the incidence of tachycardia during the period of observation were calculated from data obtained from surveys conducted on four groups of normal people. The mortality rate and the morbidity associated with the W-P-W syndrome are discussed. From observations on these groups of subjects and from similar observations reported in the medical literature the conclusion is reached that asymptomatic aviators and aviation candidates with the W-P-W anomaly could be allowed to continue in an unrestricted flying status but those with paroxysmal tachycardia should be permanently disqualified for duty involving the actual control of aircraft. (Author)

AD-429 001 Div. 16
OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
THE MITIGATION OF PHYSICAL FATIGUE WITH ''SPARTASE'',
by Francis J. Nagle, Bruno Balke, Richard V. Ganslen, and Audie W. Davis, Jr. July 63, 10p.
CARI 63 12 Unclassified report

Descriptors: (*Salts, Fatigue (Physiology)), Potassium, Magnesium, Metabolism, Sleep, Exercise, Performance tests, Physiology.

Pharmacological and clinical observations have indicated that Spartase -- the aspartic acid salts of potassium and magnesium -- takes part in the intermediary metabolism and moderates physical fatigue. In this study attempts were made to evaluate effects of the drug on work capacity before and after episodes of physically fatiguing exercises. Work capacity was determined by a standardized treadmill test. The test was repeated after the subject had been running cross-country for a period of 60 minutes, and again after another such period of 40 minutes. In this way effects of fatigue upon functional adaptability to stress became apparent. Then, Spartase was taken orally in a prescribed dose for two weeks whereupon the same testing pro-

cedure was reapplied. The results indicated that Spartase improved the endurance performance of untrained individuals engaging in extremely fatiguing physical work. It appeared to have no effect on highly trained individuals. (Author)

AD-429 027 Div. 16, 30
OTS price $6.60

Frost Engineering Development Corp., Denver, Colo.
HUMAN BODY DYNAMICS UNDER SHORT-TERM ACCELERATION.
23 June 62, 64p. Rept. no. 115 2
Contract N167 19747X
Unclassified report

Descriptors: (*Acceleration tolerance, Mathematical models), Models (Simulations), Theory. Dynamics, Man, Experimental data, Posture, Analog computers, Biophysics.

This report reviews the development of the theory of body dynamics and shows how it can be used to obtain solutions to important engineering problems. (Author)

AD-429 062 Div. 16
OTS price $2.60

Mississippi State U., State College.
PHYSICAL, CHEMICAL AND MICROBIOLOGICAL EVALUATION OF ELECTROCHEMICAL DEGRADATION OF HUMAN WASTES.
Informal progress rept. no. 6, 1 Oct-31 Dec 63.
31 Dec 63, 23p.
Contract AF41 609 1633
Unclassified report

Descriptors: (*Electrolysis, Sewage), Degradation, Electrodes, Materials, Biological assay, Algae, Growth, Culture media, Nitrogen, Chemical reactions.

Six metals were employed as electrodes to determine their utility in the breakdown of daily output during electrolysis. Gold, indium, and vanadium were unsatisfactory. Iridium, palladium and rhodium destroyed the daily output during electrolysis but at a much slower rate than platinum. Studies of the growth rate of Chlorella 71105 in electrolyzed daily output and in Knop's medium were conducted. It was found that the EDO yielded only half as much growth as the Knop's medium in a 96-hour period. Growth studies were conducted utilizing EDO resulting from the use of cobalt, gold, indium, iridium, nickel, palladium, rhodium, vanadium and zirconium. The results were compared with growth produced in EDO from an all platinum system. Iridium EDO yielded the greatest growth. Nickel EDO, palladium EDO, and rhodium EDO produced growth responses similar to that exhibited by the EDO from an all platinum system. (Author)

AD-429 190 Div. 16
OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE BIOELECTRICAL RESPONSE OF THE INSECT EYE TO BETA RADIATION,
by J. C. Smith and D. J. Kimeldorf. 29 Nov 63, 27p.
Task MR005 08 5201
NRDL TR698 Unclassified report

Descriptors: (*Radiation effects, Eye), Lepidoptera, Beta particles, Electrical properties, Retina, Light, Stimulation, Radiobiology.

Moths of the family Noctuidae were used to determine the bioelectric responses of the compound eye to ionizing radiation. It was found that beta-radiation can induce a bioelectric reaction in the compound eye of the insect. The electroretinographic pattern is indistinguishable from that produced in response to a light stimulus. The flicker-fusion frequency threshold is also similar for the two stimuli. However, a difference exists between light and beta-radiation in the time course of the dark adaptation process. It could be demonstrated that the disparity is dependent upon the interaction of visual pigment with the light stimulus. An electroretinogram response was elicited by a beta-radiation exposure dose of less than one milliroentgen at the radiation dose rate of 20mr/second. (Author)

AD-429 241 Div. 16
OTS price $1.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
FLASHBLINDNESS: A PROBLEM OF ADAPTATION,
by J. H. Hill and Gloria T. Chisum. 4 Dec 63, 8p.
NADC MA6327 Unclassified report

Presented at the ACLANT Symposium for NATO Medical Officers and Health Ministers held 29-30 Oct 63, at the Naval Medical Research Inst., National Naval Medical Center, Bethesda, Md.

Descriptors: (*Flashblindness, Protective coverings), (*Eye, Adaptation (Physiology)), Visual acuity, Eyeglasses, Light, Physiology.

Flashblindness, the temporary reduction in visual sensitivity due to exposure to a high intensity flash, is a potential problem to pilots of modern high performance aircraft. Some of the possible solutions to this problem are presented and evaluated in this paper. A brief description of the visual processes affected is given. The relation of light adaptation and dark adaptation of the eye to the changing lighting conditions and the recovery of sensitivity to a functional level are discussed. The suitability of fixed density goggles as a protective system is examined and the results of the simulation of protective devices with closing times of 33 microseconds, 165 microseconds and 9.8 milliseconds are reviewed. Eye patch studies are also discussed. (Author)

AD-429 272 Div. 16
OTS price $2.60

Milan U. (Italy)
(No title).
Summary of final rept.
Dec 63, 1v.
Grant AF AFOSR62 424
AFOSR 64 0015 Unclassified report

Descriptors: (*Endocrine glands, Secretion), Cerebral cortex, Rats, Tissue extracts, Bovines, Sodium, Potassium, Water, Kidneys, Excretion, Serotonin, Ascorbic acid, Hormones, Physiology.

The experiments described deal with the effects of pineal and habenular extracts on renal excretion of Na, K, and water. These experiments were carried out on the assumption that the pineal gland would contain some of the substances active on hydro-mineral metabolism described in literature, such as adrenoglomerulotrophin. The total extracts of the cerebral cortex, pineal, and

epithalamus reduce the ovarian ascorbic acid (A.A.O.) when assayed in Parlow's test.

Serotonin in doses of 25 micron g has a depleting action on the ovarian ascorbic acid; melatonin does not. The extracts, 15 minutes after intravenous injection, increase the LH-like activity of the plasma in castrated rats treated with Estradiol and Progesterona. Serotonin in doses of 50 micron g did not produce this effect. The behavior of the extracts is that of a LH-releasing factor. (Author)

AD-429 273 Div. 16
OTS price $1.10

Harvard School of Dental Medicine, Boston, Mass.
HYPOTHALAMIC SECRETORY FACTOR FOR ADRENOCORTICOTROPIC HORMONE (SF-ACTH).
Final technical rept., 15 Aug 62-14 Aug 63, by Paul L. Munson. 20 Dec 63, 3p.
Grant AF AFOSR62 212
AFOSR 64 0016 Unclassified report

Descriptors: (*Adrenocorticotropic hormone, Purification), Hormones, Biological assay, Rats, Secretion, Stress (Physiology), Biosynthesis.

The purpose of this research is to purify the hypothalamic hormone responsible for the increased biosynthesis and secretion of ACTH in stress. Because the only feasible guide to yield and specific activity of hormone during purification steps is a complicated biological assay system, we also are engaged in studies of ways to improve and simplify the biological assay. The principal and perhaps only suitable methods of biological assay for the hypothalamic secretory factor for ACTH are based on our original finding that in the rat anesthetized with pentobarbital, morphine inhibits ACTH secretion to nonspecific stimuli without interfering with the action of the hypothalamic factor on the anterior pituitary gland. One of the difficulties in the method is that the combination of the two drugs in adequate doses, pentobarbital and morphine, is rather toxic to the rat. By pretreating the rats several hours before use with cortisol or a synthetic analogue like dexamethasone, it has been found by other investigators that either may be substituted for pentobarbital as the anesthetic. This should be an advantage, because the ether-morphine combination is relatively nontoxic to rats. (Author)

AD-429 348 Div. 16
OTS price $1.10

Walter Reed Army Inst. of Research, Washington, D. C.
DOUBLE ISOTOPE DERIVATIVE MEASUREMENT OF HORMONES IN STRESS.
Final technical rept., 1 July 62-30 June 63, by John A. Jones. 2 Jan 64, 4p.
Unclassified report

Descriptors: (*Stress (Physiology), Hormones), (*Hormones, Measurement), Isotopes, Secretion, Urine, Blood plasma, Test methods.

The double isotope derivative measurement of hormones in stress has been applied to the measurement of aldosterone in urine and plasma samples from the rhesus monkey. The data show that definite patterns of response in aldosterone secretion is associated with selected stress situations. The direction and magnitude of these responses is discussed and data is given relative to some of the parameters which influence these responses. The application of the double isotope derivative measurement of plasma testosterone is examined. Redesign and evaluation of the analytical method is discussed and some preliminary results are reported. (Author)

17. METALLURGY

AD-427 919 Div. 17, 25
OTS price $4.60

Illinois U., Urbana.
CYCLIC STRAIN ACCUMULATION UNDER COMPLEX MULTIAXIAL LOADING,
by G. J. Moyar and G. M. Sinclair. Dec 63, 39p.
Contract AF33 616 8177, Proj. 7351, Task 735106
RTD TDR63 4120 Unclassified report

Descriptors: (*Copper, Pipes), (*Pipes, Deformation), Stresses, Strain (Mechanics), Creep, Plasticity, Theory, Loading (Mechanics), Shear stresses, Fatigue (Mechanics), Fracture (Mechanics), Mathematical analysis.

When a tubular specimen of copper is subjected to a small steady tension and alternating torsion at room temperature large axial strain increments accumulate on a cyclic basis. At relatively low values of axial stress a steady state cyclic strain accumulation is observed to develop. The strains and cyclic strain rates which are observed are many orders of magnitude greater than corresponding values obtained under conditions of standard static creep tests performed at the same peak effective stress. They are also many larger than those obtained due to simple repetition of the effective stress in more conventional dynamic creep tests. The experiments reported herein were designed to produce an extreme case of cyclic creep wherein time and temperature dependence are minimized. The analysis of results includes a comparison with plasticity theory predictions as well as a parameteric description of minimum cyclic creep rate. (Author)

AD-427 992 Div. 17, 26, 27
OTS price $10.10

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM.
Interim technical engineering rept. no. 1, 1 July-30 Sep 63,
by F. S. Turner. Oct 63, 1v.
Contract AF33 657 11261, Proj. 8 109
RTD TR8 109, vol. 1 Unclassified report

Descriptors: (*Tantalum alloys, Pipes), (*Pipes, Material forming), Nuclear propulsion, Auxiliary power plants, Liquid metal cooled reactors, Thermionic converters, Heat exchangers, Thermocouples, Reactor fuel clodding, Reactor materials, Rocket motor nozzles, Powder metallurgy, Melting, Forging, Extrusion, Welding, Bibliographies, Reviews, Mechanical properties.

A state-of-the-art analysis has been completed covering potential application for, domestic and foreign technology used in the production of, and a review of mechanical and physical property data on tantalum alloy tubing. Usage was made of a questionnaire, personal visitations and contacts, and a review of domestic and foreign literature. The survey revealed that the primary potential utilization of tantalum alloy tubing is in nuclear aerospace propulsion and auxiliary power systems. The proposed program for Phases II, III and IV is submitted. (Author)

AD-428 043 Div. 17, 13
OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
GROUND ROD METALS - FIELD TEST INSTALLATION,
by Alfred E. Hanna. 27 Dec 63, 9p.
NCEL TN542 Unclassified report

Descriptors: (*Ground (Electrical), Corrosion resistant alloys), (*Steel, Ground (Electrical)), (*Copper, Ground (Electrical)), (*Corrosion resistant alloys, Ground (Electrical)), Iron alloys, Stainless steel, Magnesium alloys, Zinc, Aluminum alloys, Corrosion, Test methods, Nickel alloys, Rods.

Ivestigation of metals which might serve as ground rods is reported. Thirty-one rods of 8 different metal systems were tested. The metal systems were mild steel, galvanized steel, Ni-Resist, Type 302 stainless steel, copper-clad steel, high-purity zinc, Az31B magnesium alloy, and No. 6061-T6 aluminum alloy. Single rods of mild steel were coupled to single rods of the other 7 metal systems; in addition, 2 mild steel rods were coupled to single rods of copper-clad steel, magnesium, and zinc, to provide the different anode-to-cathode area ratios. Results are not included in this report. (Author)

AD-428 130 Div. 17, 27
OTS price $1.60

Naval Research Lab., Washington, D. C.
AN ELECTRON MICROSCOPE STUDY OF CRACK SURFACES IN A TUNGSTEN ROCKET NOZZLE INSERT,
by E. Philip Dahlberg. Sep 61, 11p.
NRL MR1217 Unclassified report

Descriptors: (*Nozzle inserts, Tungsten), (*Tungsten, Fracture (Mechanics)), (*Fractography, Electron microscopy), Grain structures (Metallurgy), Surfaces, Simulation, Plasticity, Deformation, Grain boundaries.

The electron microscope was used to study the fracture surfaces of cracks in fragments of a sintered tungsten rocket nozzle insert that failed during test firing. A hitherto unreported fracture mode was found; this is termed plastic intergranular decohesion because of evidence that a large amount of plastic deformation preceded grain-boundary separation. (Author)

AD-428 131 Div. 17
OTS price $1.60

Naval Research Lab., Washington, D. C.
AN ELECTRON MICROSCOPE INVESTIGATION OF FATIGUE FRACTURES IN A HIGH-STRENGTH SHEET STEEL,
by E. P. Dahlberg. Feb 62, 12p.
NRL MR1281 Unclassified report

Descriptors: (*Steel, Fracture(Mechanics)), (*Fractography, Electron Microscopy), Sheets, Fatigue (Mechanics), Plasticity, Deformation, Brittleness, Stresses.

The electron microscope was used to study the fracture surfaces of center-slotted sheet steel specimens that were tension-tension fatigued to failure. Typical fatigue fracture markings were found on the slow crack growth regions of annealed specimens but were not found on the same regions of hardened and tempered specimens. The transition from slow crack growth to rapid fracture propagation in the hardened specimens took place over an extended length of the fracture surface. Alternating areas of slow and rapid fracture propagation produced a banded structure in this transition zone. (Author)

AD-428 132 Div. 17
OTS price $1.60

Naval Research Lab., Washington, D. C.
EFFECT OF TEST TEMPERATURE UPON THE TOPOGRAPHY OF

FRACTURE SURFACES OF AMS 6434 SHEET STEEL SPECIMENS,
by C. D. Beachem. Mar 62, 12p.
NRL MR1293 Unclassified report

Descriptors: (*Steel, Fractography), (*Fractography, Electron microscopy), Sheets, Deformation, Plasticity, Ductility, Rupture, Temperature, Low temperature research, Heat treatment, Tensile properties, Stresses, Fracture(Mechanics), Brittleness, Surfaces, Simulation.

AMS 6434 sheet steel fracture surfaces were examined with the electron microscope. Fracture surfaces formed at 81, -100 and -280 F show a decrease in visible plastic deformation on the surface with decreasing test temperature as well as a change in fracture mode from ductile rupture to cleavage. (Author)

AD-428 133 Div. 17
OTS price $2.60

Naval Research Lab., Washington, D. C.
CHARACTERIZING FRACTURES BY ELECTRON FRACTOGRAPHY. PART IV. THE SLOW GROWTH AND RAPID PROPAGATION OF A CRACK THROUGH A NOTCHED TYPE 410 STAINLESS STEEL WIRE SPECIMEN,
by C. D. Beachem. Apr 62, 26p.
NRL 1297 Unclassified report

Descriptors: (*Fractography, Electron microscopy), (*Fracture(Mechanics), Stainless steel), Wire, Ductility, Rupture, Stresses, Surfaces, Failure (Mechanics), Stresses.

Electron microscopic examination of a fracture surface indicates that a basic difference in the fracture modes associated with slow crack growth and fast fracture can exist. The examination also shows that the ductile rupture dimples might be used to interpret the direction of crack growth in some instances, and that the shape of ductile rupture dimples is dependent upon the state of stress. (Author)

AD-428 134 Div. 17
OTS price $3.60

Naval Research Lab., Washington, D. C.
CHARACTERIZING FRACTURES BY ELECTRON FRACTOGRAPHY PART V. SEVERAL FRACTURE MODES AND FAILURE CONDITIONS IN FOUR STEEL SPECIMENS.
Interim rept.,
by C. D. Beachem. Aug 62, 30p.
NRL MR1352 Unclassified report

Descriptors: (*Fractography, Electron microscopy), (*Fracture (Mechanics), Steel), Failure (Mechanics), Fatigue(Mechanics), Stainless steel, Terminal ballistics, Stresses, Pressure vessels, Ductility, Metal plates, Welds, Brittleness, Rupture, Surfaces, Simulation.

The fracture surfaces of four quite different specimens were examined by electron fractography. The specimens were obtained from a large, thick-walled, steel pressure vessel which had been hydrostatically fatigued to failure, a very large steel tensile specimen tested at -100 F for a fracture propagation evaluation, scabbing caused by the impact of hypervelocity projectiles against AISI 304 stainless steel and spheroidized 4340 steel plates. (Author)

AD-428 137 Div. 17
OTS price $1.60

Naval Research Lab., Washington, D. C.
FRACTOGRAPHY. PART XIII EXAMINATION OF ELEVATED-TEMPERATURE FRACTURE IN A LOW-CARBON FREE-MACHINING STEEL.
Interim rept.,
by E. P. Dahlberg and J. E. Flint. Aug 63, 15p.
NRL MR1447 Unclassified report

Descriptors: (*Fractography, Electron microscopy), (*Fracture (Mechanics), Steel), Brittleness, Temperature, High temperature research, Martensite, Impurities, Manganese compounds, Sulfides, Microstructure, Hardness, Surfaces.

A small cylindrical steel collar adapted for use in a laboratory extrusion die assembly suddenly broke in a brittle manner into two pieces during an extrusion operation in which the temperature of the collar was at 600 F. It was suspected that this was above the transition temperature, and an investigation was made in order to extract such information as might be available and pertain to the problem of similar catastrophic rupturing of pressurized containers at elevated temperature. The electron microscope was employed to characterize the service fracture, which was concluded to have been generated by the growth and coalescence of voids around rod-shaped nonmetallic inclusions. This is an example of a brittle fracture occuring at a temperature too high for the cleavage mode to operate. (Author)

AD-428 138 Div. 17
OTS price $1.60

Naval Research Lab., Washington, D.C.
FRACTOGRAPHY WITH THE ELECTRON MICROSCOPE PART XIV. WROUGHT IRON,
Interim rept.
by A. J. Edwards, C. D. Beachem and E. P. Dahlberg. Sep 63, 16p.
NRL MR1454 Unclassified report

Descriptors: (*Fractography, Electron microscopy), (*Fracture (Mechanics), Iron), Surfaces, Simulation, Ductility, Slags, Brittleness, Microstructure, Low temperature research, High temperature research.

The fractures of wrought iron on a macroscopic scale are strikingly different from other ferrous alloys. As part of a program to accumulate information on the features of a large number of fracture types on the scale seen in the electron microscope, fractures in this metal were examined by the standard procedures of electron fractography. (Author)

AD-428 139 Div. 17
OTS price $1.60

Naval Research Lab., Washington, D. C.
FRACTOGRAPHY PART XV. SOME ARTIFACTS POSSIBLE WITH THE TWO-STAGE PLASTIC CARBON REPLICATION TECHNIQUE,
Interim rept.,
by E. P. Dahlberg and C. D. Beachem. Sep 63, 18p.
NRL MR1457 Unclassified report

Descriptors: (*Fractography, Electron microscopy), (*Fracture (Mechanics), Surfaces), Simulation, Plastics, Carbon, Cellulose acetates, Drops, Bubbles, Errors.

Several artifact structures are shown which are known to occur sometime with the two-stage, plastic-carbon technique of fracture surface replication for electron microscopic observation. The orgin and characteristic features of each artifact are discussed. (Author)

Division 17 - METALLURGY

AD-428 226 Div. 17, 25
OTS price $1.50

Naval Research Lab., Washington, D. C.
THE EFFECT OF SPECIMEN SIZE ON THE FATIGUE CRACK STRENGTH OF CYLINDRICAL SPECIMENS OF HEAT-TREATED 4340 STEEL.
Final rept.
by E. P. Klier. 16 Dec 63, 14p.
Proj. RR007 01 46 5409
NRL 6012 Unclassified report

Descriptors: (*Steel, Fracture (Mechanics), (*Fracture (Mechanics), Test methods), Fatigue (Mechanics), Tensile properties, Ductility, Brittleness, Stresses, Strain (Mechanics), Energy, Absorption, Heat treatment, Low temperature research, Cryogenics, Transition temperature.

The present series of tests for a one-inch-diameter fatigue-notched specimen constitutes an extension of a previous series of tests for a one-half-inch-diameter specimen. The principal hange introduced is the specimen size. This change in specimen size leads to minor variations in the fatigue-notch tensile-strength data, but for certain material conditions and specimen-size ranges the notch strength can be profoundly altered. The ductile-brittle transition indicated is critically dependent on tensile strength. During the present tests load-elongation curves were taken, and these have allowed the examination of the ductile-brittle transition as established by stress, by strain, and by means of energy absorption. The experiments suggest that the stress-strain relations in certain fracture tests correspond to those measured for the notch tensile test. (Author)

AD-428 244 Div. 17, 27
OTS price $9.60

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE.
Quarterly rept. no. 12, 1 Apr-30 June 63,
by H. A. Hauser and W. E. Helfinch. 30 July 63, 1v. Rept. no. 2254
Contract DA19 020ORD5230, Projs. TB4 004; 5B93 32 004
WAL 766 2 1 13 Unclassified report

Descriptors: (*Rocket cases, Titanium alloys), (*Titanium alloys, Material forming), Metal spinning, Forging, Welding, Rolling (Metallurgy), Hydrostatic pressure, Hot working, Cold working, Aging (Materials), Heat treatment, Fracture (Mechanics), Toughness, Stresses, Microstructure, Tensile properties, Hydrogen, Oxygen, Vanadium alloys, Chromium alloys, Aluminum alloys, Molybdenum alloys.

This report presents (1) final results of notched sustained-load tests conducted on flow-turned material with hydrogen contents of 70 and 200 ppm, (2) results of investigation of hot rolling using resistance seam welding equipment as a stress-relieving technique for B-120 VCA titanium alloy weldments, (3) evaluation, including mechanical property testing, of full scale front dome burst-test assembly after hydro-static testing to destruction, (4) the effects of severe cold working on the 975F aging properties of Ti-15 Mo alloy, and (5) the fracture toughness properties of Ti-15 Mo alloy at various yield strength levels. (Author)

AD-428 281 Div. 17, 26
OTS price $3.60

Astronuclear Lab., Westinghouse Electric Corp. Pittsburg, Pa.
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET.
Quarterly rept. no. 6, 15 Aug-15 Nov 63,
by R. L. Ammon, J. L. Godshall, and R. T. Begley. 15 Jan 64, 29p. Rept. no. WANL PR M007
Contract N600 19 59762
Unclassified report

Descriptors: (*Tantalum alloys, Sheets), (*Sheets, Material forming), Melting, Electric arcs, Forging, Tungsten alloys, Hafnium alloys, Carbon alloys, Rolling (Metallurgy), Chemical analysis, Tensile properties, High temperature research, Heat treatment, Recrystallization, X-ray diffraction analysis, Ductility, Carbon, Nitrogen, Alternating current.

The evaluation of T-222 (Ta-9.6W-2.4HF-0.01C) sheet was continued. A second 3 in. diameter ingot of T-222 was melted and processed to sheet to provide additional material for evaluation. Tensile properties of sheet produced from a single AC arc melted ingot were comparable at 2400 F to properties of sheet produced from a double AC melted ingot. At 3000 F the single AC melted material showed abnormal scatter in the data, while double arc melted material showed consistent properties. Several smaller heats of experimental alloys were also melted and processed to sheet. Phase identification studies of T-222 were also continued with emphasis on the development of a reliable technique for 2ulk extraction of precipitated phases from Ta-W-HF-C alloys. (Author)

AD-428 397 Div. 17, 30
OTS price $1.60

MSA Research Corp., Callery, Pa.
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS.
Quarterly progress rept. no. 5, Sep-Nov 63,
by F. Tepper and J. Greer. 13 Dec 63, 15p.
Rept. no. 63 172
Contract AF33 657 9168
Unclassified report

Descriptors: (*Cesium, Compatibility), (*Liquid metals, Cesium), (*Containers, Cesium), (*Corrosion resistant alloys, Cesium), Cobalt alloys, Chromium alloys, Nickel alloys, Niobium alloys, Molybdenum alloys, Solubility, Heat-resistant metals & alloys, Corrosion-resistant alloys, Carbon, Oxygen, Laboratory equipment, Refractory coatings.

A device for the determination of the solubility of carbon in cesium is presently being constructed. Solubility studies of the alloys, Haynes-25, niobium-1% zirconium and molybdenum-0.5% titanium in liquid cesium are continuing and preliminary rates are given for Haynes-25. Investigation of the mechanisms associated with attack of liquid cesium on these alloys and TD-Nickel continue with the utilization of cesium containing carbon and oxygen additions. (Author)

AD-428 513 Div. 17
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
LABORATORY INVESTIGATION OF THE EFFECTS OF CATHODIC PROTECTION ON THE CORROSION OF THE GALVANIZED COATING ON GALVANIZED STEEL,
by T. E. Backstrom. 1 July 63, 7p.
BR D LR SI35 Unclassified report

Descriptors: (*Steel, Zinc coatings), (*Zinc coatings, Corrosion), (*Cathodic protection,

Zinc coatings), Anodes, Magnesium, Effectiveness, Electrochemistry.

An investigation was made to determine the possible benefit of cathodic protection to the service life of galvanized iron or steel. Sacrificial magnesium anodes were used producing structure-to-electrolyte potentials of -1.04 to -1.20 volts with an average value of -1.05 volts with reference to a copper-copper sulfate half cell. Controlled laboratory tests showed that: (1) cathodic protection reduces general corrosion of the galvanized coating significantly; (2) cathodic protection does not eliminate corrosion of the galvanized coating entirely, as local pitting corrosion occurs to some extent; and (3) the equilibrium concentration of alkali at the cathode is too low to promote alkali corrosion of the cathodically protected coating. (Author)

AD-428 541 Div. 17, 4
OTS price $2.60

Pennsylvania U., Philadelphia.
A TECHNIQUE FOR THE EVALUATION OF HYDROGEN EMBRITTLEMENT.
Final rept.,
by H. Wroblowa and James McBreen. 30 June 63, 19p.
Contract N156 41854
Unclassified report

Descriptors: (*Hydrogen embrittlement, Test methods), (*Hydrogen, Permeability), Iron, Steel, Membranes, Electric currents, Stresses, Hysteresis, Electrolytes, Electrolytic cells.

Membranes of Armco iron, zone-refined iron and Vescoget H-11 steel were used. Permeation measurements were made in various ambients at a current density of 8.1 mA/sq cm. In the hysteresis experiments the membranes were mounted on a Dillon tester and when permeation reached a steady state, stress was applied. This was repeated several times apply increasing stresses. After permeation had been determined at the highest stress (35,000 psi), the procedure was reversed, i.e. permeation was determined at various decreasing stresses. (Author)

AD-428 546 Div. 17
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIFFUSION OF TANTALUM IN SINGLE-CRYSTAL GERMANIUM,
by V. I. Tagirov and A. A. Kuliyev. 7 Oct 63, 7p.
FTD MT63 107 Unclassified report

Trans. from Izvestiya Akademii Nauk Azerbaydzhanskoy SSR, Seriya Fiziko-Matematicheskikh I Tekhnicheskikh Nauk, No. 1, pp. 65-68, 1962.

Descriptors: (*Germanium, Single crystals), (*Tantalum, Diffusion), Semiconductors, Impurities, Tracer studies, Radioactive isotopes.

AD-428 554 Div. 17
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VACUUM PLATING OF REFRACTORY METALS,
by R. A. Ul'yanov, N. D. Tarasov and S. F. Kovtun. 7 Oct 63, 7p.
FTD MT63 98 Unclassified report

Trans. from Tsventnyye Metally, no. 3, pp.74-76, 1963.

Descriptors: (*Refractory metals & alloys, Vapor plating), (*Vapor plating, Refractory metals & alloys), Low pressure research, High-temperature research, Molybdenum, Niobium, Rolling (Metallurgy), Vacuum apparatus.

On the basis of the study of microstructure and michrohardness it is possible to conclude that in plating molybdenum with chrome-nickel alloys in the contact zone chemical formations practically will not be formed, although in the system molybdenum-nickel the formation of three chemical formations is possible and solubility of nickel in molybdenum at a temperature of rolling consists of 0.5%. A certain growth of microhardness in the contact zone is observed in plating of niobium with alloy EI602. Obviously, an increase of hardness here is stipulated at the expense of preferable diffusion of nickel into niobium (The Kirkendall Effect) in the contact zone a solid solution will be formed on the basis of a Ni3Nb compound, and a niobium and chrome compound. When plating niobium with zirconium or titanium, the increase in hardness is insignificant. A 2-hour soaking of molybdenum and niobium, plated with chrome-nickel alloys, has little influence on the structure and durability of cohesion. Soaking for 10 hours at the same temperature leads to increasing durability of the coating to 15-20%.

AD-428 626 Div. 17
OTS price $4.60

General Dynamics, Fort Worth, Tex.
STRESS CORROSION CRACKING OF HIGH STRENGTH NICKEL ALLOY STEELS FOR AIRCRAFT APPLICATION,
by John F. Hildebrand. 4 Nov 63, 1v. Rept. no. FZM2951
Contract AF33 657 11214
Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), (*Tool steel, Fracture (Mechanics)), (*Stresses, Corrosion), Nickel alloys, Heat treatment, Corrosive liquids, Landing gear, Tensile properties, Fractography, Test methods, Test equipment, Cobalt alloys.

Forged parts and billets of AISI 4340, H11 tool steel, and 9% and 18% nickel alloy steels were evaluated for susceptibility to stress corrosion cracking (SCC) by an alternate immersion test. The alloys were prepared by the consumable electrode-vacuum melt practice and were heat treated as test specimens to strengths in the range from 263,000 to 290,000 psi. Polished specimens were alternately immersed in a 5% NaCl solution while sustaining a load equivalent to 75% of the ultimate strength. (Author)

AD-428 748 Div. 17, 25
OTS price $1.60

David Taylor Model Basin, Washington, D. C.
HYDROSTATIC TESTS OF INELASTIC AND ELASTIC STABILITY OF RING-STIFFENED CYLINDRICAL SHELLS MACHINED FROM STRAIN-HARDENING STEEL,
by Kenneth Hom and William P. Couch. Dec 61, 17p.
Proj. S F03 0302
DTMB 1501 Unclassified report

Descriptors: (*Stiffened cylinders, Failure (Mechanics)), (*Steel, Structural shells), Hydrostatic pressure, Buckling (Mechanics), Theory, Elasticity, Stresses, Strain (Mechanics), Mathematical analysis, Experimental data.

Ten ring-stiffened cylindrical shells machined from strain-hardening steels with yield strengths of 70,000 psi and 100,000 psi were tested to collapse under external hydrostatic

pressure. The cylinders were designed to cover a range of thinness ratio from 0.85 to 1.67. Four of the cylinders collapsed in a combined asymmetric (lobar) and axisymmetric mode; the other six cylinders failed only in the lobar mode. Agreement within 4% was obtained between the experimental collapse pressures and the theoretical pressures computed from Reynolds' inelastic lobar buckling theory for those cylinders with thinness ratios of 0.85 to 1.10 and from Reynolds' elastic lobar buckling theory for those cylinders with thinness ratios greater than 1.40. However, agreement was only fair between experimental pressures and the pressures computed from Reynolds' inelastic theory for those cylinders with thinness ratios between 1.10 and 1.40; these cylinders were still in the inelastic range but tending toward the elastic range. (Author)

AD-428 772 Div. 17
OTS price $2.60

Vienna U. (Austria).
INVESTIGATIONS OF RARE EARTH-MANGANESE-ALLOYS (0 -25% Mn),
by F. Lihl. 31 July 63, 27p. Technical note no. 5
Contract 61 052 609
Unclassified report

Descriptors: (*Rare earth elements, Alloys), (*Manganese alloys, Preparation), (*Mercury alloys, Preparation), Samarium, Yttrium, Manganese, Mercury, Solutions, Evaporation, Crystal structure, Crystal lattices, X-ray diffraction analysis, Metallography.

The preparation of rare earth (RE)-Mn-amalgams, evaporation of mercury, preparation of mercury-free alloys, and the examination of the alloys by metallographic and X-ray methods are described. Preparation of the RE (Y, Sm)-Mn-amalgams was simplified by developing a special method. Manganese metal, if pretreated in the right manner, can be dissolved simultaneously with the RE-metal in mercury, yielding directly the RE-Mn-amalgam (RE + Mn ≠ approx. 1 wt-%). By this method pure amalgams, not contaminated by oxygen, can be produced in a reasonable time. (Author)

AD-428 861 Div. 17, 25
OTS price $1.10

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
DEFORMATION PROCESSING OF ANISOTROPIC METALS.
Progress rept. no. 2, 1 Sep-31 Oct 63,
by D. H. Avery and W. A. Backofen. Dec 63, 3p.
Contract NOw63 0564d
Unclassified report

Descriptors: (*Metals, Deformation), (*Titanium alloys, Anisotropy), Strain (Mechanics), Temperature, Test methods, Stresses, Plasticity, Rolling (Metallurgy), High-temperature research, Tin alloys, Aluminum alloys.

Work was carried out primarily in two related areas: (1) further exploration of the plane-strain deformation of the alpha (2.5 Sn - 5 Al) titanium alloy; (2) and the variation of plastic anisotropy with temperature and strain. One of the problems in an evaluation of plane-strain compression data is determining the friction-hill contribution to the measured load. Currently, plane-strain indentations are being made with a series of indentors of increasing width, Mos2 and 2-mil Teflon film are the lubricants. Other experiments have been based on plane-strain tension tests to avoid frictional complications. In this case plane-strain is enforced by milling a groove, across both faces of a strip specimen, at right angles to the loading axis; and producing a reduced section with a thickness of only 15% of that of the sheet, a length 4 times the thickness, and a width 40 times the thickness. Stress-strain curves from these samples are parallel to the compression curves and approximately 10% lower. (Author)

AD-428 946 Div. 17
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
PREPARATION OF STEEL WELDMENTS FOR RADIOGRAPHIC STANDARDS; REPORT AML-1839.
Final rept.
23 Dec 63, 2p.
Task RREN ST201 200 5 0000 00 000
NAEC AML 1839 Unclassified report

Descriptors: (*Welds, Standards), (*Radiography, Welds).

AD-428 949 Div. 17, 26
OTS price $4.60

Battelle Memorial Inst., Columbus, Ohio.
SURVEY OF THE CURRENT KNOWLEDGE OF THE DEFORMATION CHARACTERISTICS OF BERYLLIUM AND THE REFRACTORY METALS.
Quarterly progress rept. no. 2, 14 Sep-14 Dec 63,
by A. R. Rosenfield, A. H. Clauer, M. J. Klein, and W. S. Lyman. 13 Jan 64, 1v.
Contract N600 19 60240
Unclassified report

Descriptors: (*Metals, Deformation), (*Material forming, Reviews), Extrusion, Rolling (Metallurgy), Forging, Drawing (Machine processing), Anisotropy, Strain (Mechanics), Aging (Materials), Dynamics, Friction, Lubrication, Crystal structure, Grain structures (Metallurgy), Beryllium, Refractory metals and alloys, Reports, Research program administration.

Priorities were assigned for treating eight topics to be included in the survey of current knowledge of the deformation characteristics of beryllium and the refractory metals. Writing began on three of the topics--extrusion, preferred orientations, and high-strain-rate deformation. The latter two drafts are included. (Author)

AD-429 004 Div. 17, 25
OTS price $4.60

Republic Aviation Corp., Farmingdale, N. Y.
INVESTIGATION OF THE BASIC MECHANISM OF METAL FATIGUE.
Quarterly engineering progress rept. no. 2, 1 Oct-31 Dec 63,
by Barry Z. Hyatt and Louis J. Teutonico.
23 Jan 64, 1v. Rept. no. RAC921 2
Contract NOw63 07040
Unclassified report

Descriptors: (*Metals, Fatigue (Mechanics)), (*Single crystals, Crystal lattice defects), (*Fatigue (Mechanics), Copper), Stresses, Crystal growth, Electroerosive machining, Deformation, Ultrasonic radiation, Attenuation, Velocity, Strain (Mechanics), Loading (Mechanics), Shear stresses, Damping, Test equipment, Instrumentation.

Improved methods were devised for electrochemical cutting and chemical polishing of single crystal copper test specimens. The mechanical loading

system designed for the cyclic deformation of single crystals was calibrated and the reliability of strain measurements was determined. Measurements were made of the attenuation of longitudinal waves propagating through <110> oriented single crystals of copper during cyclic deformation. A general review 'The Use of High Frequency Ultrasonic Measurements to Study the Effects of Dislocations on the Mechanical Properties of Crystalline Solids' is included as an Appendix. (Author)

AD-429 028 Div. 17
OTS price $6.60

Solar, San Diego, Calif.
DEVELOPMENT OF PROTECTIVE COATING FOR TANTALUM BASE ALLOYS,
Quarterly progress rept. no. 2, 1 Sep-31 Nov 63, by B. Ohnysty and A. R. Stetson, 12 Dec 63, 58p. Rept. no. RDR1360 2
Contract AF33 657 11259
Unclassified report

Descriptors: (*Tantalum alloys, Protective treatments), (*Refractory coatings, Silicides), Tungsten alloys, Oxidation, Oxides, Oxygen, Diffusion, High temperature research, Hafnium compounds, Zirconium compounds, Niobium alloys, Vanadium alloys, Thermal expansion, Thermal stresses, Microstructure, Yttrium compounds, Tantalum compounds, Additives, Aluminum, Boron, Chromium, Manganese, Molybdenum, Titanium, Tungsten, Vanadium, Niobium, Sodium compounds, Fluorides, Silicon.

Pack cementation studies were conducted on 90Ta-10W alloy with pure silicon and silicon plus tungsten, molybdenum, chromium, vanadium, boron, manganese and aluminum. Oxidation test results at 2700 F indicated that the vanadium-chromium, titanium-chromium, and titanium-modified silicide provided the longest oxidation lives, i.e., three to five hours. The straight silicide and tungsten, molybdenum, and vanadium modified silicide gave lives up to three hours. Chromium modified silicide provided the shortest life. Measurement of the thermal expansivities and oxygen diffusio rates through high hafnia oxide compositions continued. Modification of hafnia with zirconia and/or yttria appeared to be capable of producing a close expansion match with 90Ta-10W alloy. (Author)

AD-429 049 Div. 17, 26
OTS price $1.60

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM.
Interim technical engineering rept. no. 2, 15 Oct 63-15 Jan 64,
by F. S. Turner. Jan 64, 9p.
Contract AF33 657 11261
RTD 8 109, Vol. 2 Unclassified report

Descriptors: (*Tantalum alloys, Pipes), (*Pipes, Tantalum alloys), Manufacturing methods, Tungsten alloys, Hafnium alloys, Carbon alloys, Material forming, Extrusion, Machine tools, Dies, Mandrels, Design.

Efforts were devoted to material procurement and to tooling design and manufacture. Detail drawings of the dies, mandrels, dummy blocks, etc., are presented. (Author)

AD-429 126 Div. 17, 25
OTS price $9.10

Midwest Research Inst., Kansas City, Mo.
RESEARCH ON THE MECHANISMS OF FATIGUE.
Rept. for 1 Dec 61-31 Aug 63,
by J. C. Grosskreutz. Dec 63, 96p.
Contract AF33 616 7858, Proj. 7353, Task 735301
WADD TR60 313, pt. 2 Unclassified report

Report on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances.

Descriptors: (*Fatigue (Mechanics), Metallic crystals), (*Aluminum, Fatigue (Mechanics)), Crystal substructure, Crystal lattice defects, Strain (Mechanics), Grain boundaries, Fracture (Mechanics), Propagation, Stresses, Surfaces, Coatings, X-ray diffraction analysis, Electron microscopy, Hardening.

The accumulation of fatigue damage was studied on a microscopic scale in polycrystalline aluminum cycled at constant strain. At moderate strain amplitudes, ±2 x 10 to the -3rd power, the dominant feature is a subgrain structure which originates with the clustering of dislocations into sub-boundaries during the first few hundred cycles of strain. At low strains, ±3 x 10 to the -4th power, large concentrations of dislocation loops are formed, either near subgrain boundaries, or on glide planes in areas devoid of subgrains. These observations were used to construct a model of fatigue hardening which agrees with the published hardening curves for aluminum. (Author)

AD-429 131 Div. 17
OTS price $4.60

Titanium Metals Corp. of America, New York.
DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY.
Quarterly rept. no. 4, 1 Apr-30 June 63,
by D. B. Hunter. 30 June 63, 1v.
Contract DA30 069ORD3743
WAL TR405 2 3 Unclassified report

Descriptors: (*Titanium alloys, Hardening), (*Alloys, Hardening), Aluminum alloys, Chromium alloys, Iron alloys, Molybdenum alloys, Vanadium alloys, Additives, Cobalt, Copper, Nickel, Aging (Materials), Heat treatment, Cold working, Rolling (Metallurgy), Quenching (Cooling), X-ray diffraction analysis, Hot working, Fracture (Mechanics), Stability, Hardness, Microstructure, Temperature.

Alloy bases Ti-17V-10Cr-3Al; Ti-8Mo-8V-7.5Fe-3Al, and Ti-15Mo-5Fe-3Al, containing additions of up to 5% of hardening agents such as Cu, Co and Ni, were water quenched from 1350 F, instead of plate cooled, but no appreciable difference in aging response was found. A marked aging response found when selected alloys were aged at 850 F in the as-cold rolled condition was attributed to alpha precipitation. Reduction of the Fe and Cr contents of the original base alloys and a corresponding increase in the Cu content did not significantly improve fabrication properties. Partial replacement of Fe and Cr by Ni resulted in hot shortness. The possibility of developing titanium alloys hardening by way of rejection of compound from an all-beta matrix is not promising using these additions. (Author)

AD-429 137 Div. 17, 31
OTS price $3.60

United States Steel Corp., Monroeville, Pa.
DEVELOPMENT OF AN HY-130/150 WELDMENT.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63, by L. F. Porter, A. M. Rathbone, S. T. Rolfe and K. E. Dorschu. 2 June 64, 26p. Rept. no. aAS NP36
Contract NObs88540; SR007 01 01, Proj. 40 18 001 17, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Welds), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Toughness, Ship plates, Arc welding, Welding rods, Manganese alloys, Tensile properties, Fracture (Mechanics), Transformations.

Work was continued to develop a submarine-hull weldment with a yield strength in the range 130 to 150 ksi (HY-130/150). Because previous studies indicated that an experimental 5Ni-Cr-Mo-V steel was very promising as an HY-130/150 steel, an 80-ton electric-furnace heat of the steel was produced. No difficulty was encountered during production, and 1/2- through 4-in.-thick plates of the steel exhibited an excellent combination of yield strength (139 to 144 ksi) and notch toughness (80 to 87 ft-lb Charpy V-notch energy absorption at 32 F). Studies on other types of HY-130/150 steels and on the effect of minor elements on the properties of the 5Ni-Cr-Mo-V steel are essentially completed. (Author)

AD-429 138 Div. 17, 31
OTS price $2.60

United States Steel Corp., Monroeville, Pa.
EFFECT OF CHROMIUM CONTENT ON THE WELD-HEAT-AFFECTED-ZONE TOUGHNESS AND TRANSFORMATION CHARACTERISTICS OF 5Ni-Cr-Mo-V STEELS.
Progress rept.,
by A. Rygg and A. M. Rathbone. 2 Jan 64, 10p.
Rept. no. a AS NP36
Contract NObs88540; Contract SR007 01 01, Proj. 40 18 001 13, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Metal plates) (*Steel, Welds), Chromium, Toughness, Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Transformations, Fracture (Mechanics), Martensite, Microstructure.

The effect of variations in composition on the base-metal properties of ten 5Ni-Cr-Mo steels was investigated, and three of the ten steels, containing 0.5, 1.0 and 1.5% chromium, were evaluated to determine the effect of chromium on the toughness, transformation characteristics, and crack susceptibility of their simulated weld-heat-affected zones. The results showed that over the full range of practical welding conditions, the energy absorption of the various regions in the simulated weld-heat-affected zones of the three steels was high and ranged from 60 to 125 ft-lb at +80 F. In addition, the formation of fully martensitic microstructures in the simulated weld-heat-affected zones indicated that the three steels had sufficient hardenability for all practical welding conditions. (Author)

AD-429 139 Div. 17, 31
OTS price $2.60

United States Steel Corp., Monroeville, Pa.
EFFECT OF COBALT ON THE TRANSFORMATION CHARACTERISTICS OF 5NI-CR-MO STEELS.
Progress rept.,
by L. P. Connor and D. S. Dabkowski. 2 Jan 64, 11p. Rept. no. a AS NP48
Contract NObs88540; SS050 000, Proj. 40 18 002 9, Task 1567
Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Welds), Nickel alloys, Chromium alloys, Molybdenum alloys, Cobalt, Transformations, Fracture (Mechanics), Hardening, Martensite, Bainite, Microstructure.

Studies were initiated to determine (1) whether the addition of cobalt to raise the M sub s temperature would increase self tempering in a 5Ni-Cr-Mo steel without deleteriously reducing hardenability and (2) whether cobalt additions would reduce the susceptibility of a 5Ni-Cr-Mo steel to heat-affected-zone cracking. The results of high-speed dilatometric measurements on specimens heat treated to simulate the cooling of 1/2- through 4-1/2-in.-thick water-quenched plates indicated that the addition of cobalt raised the M sub s temperature of the 5Ni-Cr-Mo steel about 17 F per 1.0% cobalt in the range 0 to 5% cobalt, and also increased self tempering of the martensite. However, the addition of 8% cobalt reduced the hardenability so that an undesirable amount of coarse bainite was formed. (Author)

AD-429 140 Div. 17, 31
OTS price $5.60

United States Steel Corp., Monroeville, Pa.
EFFECT OF COLD FORMING ON THE STRESS-STRAIN CHARACTERISTICS OF HY-80 STEEL PLATES.
Progress rept.,
by S. T. Rolfe and R. P. Haak. 2 Jan 64, 1v. Rept. no. n AS1
Contract NObs88540, Projs. 40 18 003 5, SR007 01 01, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Cold working), Material forming, Deformation, Stresses, Strain (Mechanics), Heat treatment, Aging (Materials), Hardening.

This report describes the effects of cold deformation and subsequent stress relieving or aging on the stress-strain characteristics of the HY-80 steel plates. True-stress-true-strain curves were evaluated, and the results indicated that changes in the behavior of cold-formed HY-80 plates occurred primarily in the initial portion of the stress-strain curves. Analysis of the initial portions of stress-strain curves of cold-deformed material showed that material tested in the same direction as the cold deformation had a slightly lower secant modulus during loading, and a higher flow-stress curve than undeformed material because of strain hardening. Material tested in a direction opposite to the cold deformation had a lower secant modulus during loading and a lower flow-stress curve than undeformed material--a manifestation of the Bauschinger effect. (Author)

AD-429 141 Div. 17, 31
OTS price $5.60

United States Steel Corp., Monroeville, Pa.
EXPLORATORY STUDIES OF 180/210 KSI YIELD STRENGTH MARAGING STEELS.
Progress rept.,
by A. J. Birkle, D. S. Dabkowski and L. F. Porter. 2 Jan 64, 34p. Rept. no. aAS NP48
Contract NObs88540, Proj. 40 18 002 10, SS050 000, Task 1567
Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Mechanical properties), Microstructure, Toughness, Nickel alloys, Chromium alloys, Molybdenum alloys, Cobalt alloys, Material forming, Heat treatment, Quenching (Cooling), Metallography.

To investigate the feasibility of using maraging steels for 180 to 210-ksi yield strength submarine-hull applications, an extensive investigation was made of the effect of variations in composition and in processing procedures on the mechanical properties and microstructure of 1/2- to 4-in.-thick maraging-steel plates. With the

exception of a 1/2-in.-thick plate from a production heat of 12Ni-5Cr-3Mo steel and a plate from a small vacuum-consumable-electrode remelted heat of 18Ni-8Co-2Mo steel, the 16 laboratory heats, 2 production heats, and 1 INCO heat of maraging steel studied had a disappointingly low level of notch toughness, even though rather wide variations in chemical composition and processing procedure were investigated. Metallographic studies indicated that the poor toughness is probably due to titanium and zirconium carbide and/or nitride and sulfide particles precipitated during solidification of the ingot. (Author)

AD-429 142 Div. 17, 31
OTS price $3.60

United States Steel Corp., Monroeville, Pa.
FEASIBILITY OF DEVELOPING AN HY-180/210 WELDMENT.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63,
by L. F. Porter, A. M. Rathbone, S. T. Rolfe and K. E. Dorschu. 2 Jan 64, 23p. Rept. no. aAS NP48
Contract NObs88540, Projs. 40 18 002 11, SS050 000 Task 1567
Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Welds), Material forming, Toughness, Quenching (Cooling), Heat treatment, Aging (Materials), Hardening, Martensite, Microstructure, Mechanical properties, Feasibility studies, Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys.

Preliminary studies on laboratory and production experimental maraging steels being considered as HY-180/210 steels have defined a number of factors that caused low notch toughness, and several laboratory and production maraging steels have recently been produced that have significantly improved notch toughness. Further modifications in composition and processing practices are being investigated that should lead to the development of maraging steels with even better notch toughness. Several quenched and tempered steels and a steel strengthened by a combination of carbon martensite and age hardening appear promising. Several nonconventional processing procedures also appear promising as methods for increasing strength with little or no loss in notch toughness. (Author)

AD-429 143 Div. 17, 31
OTS price $3.60

United States Steel Corp., Monroeville, Pa.
SUBSTITUTION OF MANGANESE FOR NICKEL IN NI-CR-MO STEELS.
Progress rept.,
by D. S. Dabkowski, S. J. Manganello, and L. F. Porter. 2 Jan 64, 22p. Rept. no. aAS NP36
Contract NObs88540, Proj. 40 18 001 14; SR007 01 01, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Hardening), Nickel alloys, Chromium alloys, Molybdenum alloys, Manganese, Mechanical properties, Quenching (Cooling), Heat treatment.

A laboratory study was initiated in which the manganese content of six Ni-Cr-Mo steels was increased from 0.5 to 3.0% and the nickel content was decreased from 4.5 to 0.5% to maintain a calculated hardenability index of 15 to 20. The evaluation consisted of hardenability, mechanical-property, and temperability studies on water-quenched and on blower-cooled 1/2-in.-thick plates of the six vacuum-melted, vacuum-carbon-deoxidized Mn-Ni-Cr-Mo steels. The results showed that the hardenability of the higher-manganese steels (1.0 to 3.0% Mn) was less than that predicted from the calculations, and the notch toughness of the water-quenched and of the blower-cooled plates decreased continuously as the manganese content increased. (Author)

AD-429 144 Div. 17, 26
OTS price $3.60

Du Pont Metals Center E. I. Du Pont De Nemours and Co., Inc., Baltimore, Md.
COLUMBIUM ''H'' SECTION PROGRAM. PHASE I - EXTRUSION. PHASE II - DRAWING.
Interim rept. no. 2, 1 Oct 63-1 Jan 64,
by E. V. Peterson. 1 Jan 64, 26p.
Contract AF33 657 11293, Proj. 8 110
Unclassified report

Descriptors: (*Niobium alloys, Material forming), (*Material forming, Niobium alloys), Tungsten alloys, Zirconium alloys, Carbon alloys, Extrusion, Drawing (Machine processing), Lubrication, Glass, Graphite, Surface properties, Thickness, Dies, Design.

The development of the extrusion process for D-43 (Nb 10W-1Zr-0.1C) and Cb-752 (Nb-10W-2.5Zr) ''H'' sections continued. Efforts were concentrated on reduction of contamination and improvement of surface finish and dimensional control of extruded sections. Group II ''H'' extrusions (0.125 to 0.060 in. section thickness) showed reduced contamination and improved straightness, but surfaces and uniformity of section thickness were unsatisfactory. Group I extrusions were drawn from section thickness of 0.188 in. at room temperature with reductions of 5% to 18% per pass. Total reductions up to 28% were made on short lengths without intermediate annealing. (Author)

AD-429 221 Div. 17, 25
OTS price $9.10

Advanced Metals Research Corp., Somerville, Mass.
RESEARCH TO DETERMINE COMPOSITION OF DISPERSED PHASES IN REFRACTORY METAL ALLOYS. PART II. CONCENTRATION GRADIENTS IN REFRACTORY METAL BINARY DIFFUSION COUPLES.
Rept. for 1 Jan 62-28 Feb 63,
by Robert E. Ogilvie, Sheldon H. Moll and Donald M. Koffman. May 63, 98p.
Contract AF33 616 7671, Proj. 7351, Task 735101
ASD TDR62 7, pt. 2 Unclassified report

Report on Metallic Materials.

Descriptors: (*Refractory metals and alloys, Diffusion), (*Diffusion, Theory), Niobium, Vanadium, Copper, Platinum, Tantalum, Microanalysis, Electron beams, Crystal structures, Crystal lattices, Molybdenum alloys, Titanium alloys, Zirconium alloys, Carbon alloys, X-ray diffraction analysis, Carbides, Titanium compounds, Zirconium compounds, Experimental data, Tables.

The concentration gradients present in pure metal and alloy incremental, two-component, diffusion couples were determined by means of electron beam microanalysis. In a parallel study the equilibrium chemistry of individual phases present in two-phase alloys of the Ta-Pt system was determined by means of electron beam microanalysis. The crystal structures, lattice parameters and chemistries of dispersed phase precipitates in two Mo-TZC alloys (1.6 Ti-0.58 Zr-0.13C) were determined. One alloy was as-extruded and the other as-swaged. The combined techniques of X-ray diffraction and electron beam microanalysis were employed. The phases were shown to be alloy carbides of the TiC and ZrC systems. (Author)

AD-429 237 Div. 17
OTS price $8.60

IIT Research Inst., Chicago, Ill.
PILOT EVALUATION OF VANADIUM ALLOYS.
Final rept., 18 Sep 61-31 Jan 64,
by F. C. Holtz, B. R. Rajala, and L. B. Richard.
28 Jan 64, 84p. Rept. no. B231 10
Contracts NOw62 0101c; NOw61 0417c
Unclassified report

Descriptors: (*Vanadium alloys, Mechanical properties), (*Niobium alloys, Mechanical properties), Titanium alloys, Zirconium alloys, Carbon alloys, Melting, Electric arcs, Sheets, Rolling (Metallurgy), Tensile properties, High temperature research, Compressive properties, Ductility, Creep, Oxidation, Coatings, Silicides, Hardness, Welding, Extrusion, Tantalum alloys, Molybdenum alloys.

Vanadium alloy development studies and detailed property evaluations of sheet stock from 100-lb ingots of selected vanadium alloys are reported. Experimental alloys based mainly on the vanadium-niobium system were fabricated to 0.050-in. sheet which was generally very workable and weldable, and had density-corrected strengths superior to those of most niobium alloys up to 2400 F. The strongest of the highly ductile compositions were based on V-60Nb with 1 to 10 wt.-% additions of reactive and refractory metals in combination with up to 0.1 wt.-% carbon. The less ductile V-40Nb-30Ta-1Hf alloy had the highest 2400 F tensile strength, 25,400 psi. (Author)

AD-429 244 Div. 17
OTS price $1.75

Aerospace Corp., Los Angeles, Calif.
METALS AND ALLOYS FOR CRYOGENIC APPLICATIONS - A REVIEW,
by E. G. Kendall. 20 Jan 64, 61p. Rept. no.
TDR269 4240 10 6
Contract AF04 695 269
SSD 63 371 Unclassified report

Descriptors: (*Low temperature alloys, Mechanical properties), (*Alloys, Cryogenics), (*Aerospace craft, Materials), (*Cryogenics, Reviews), Liquefied gases, Propellant tanks, Stainless steel, Steel, Aluminum alloys, Cobalt alloys, Nickel alloys, Titanium alloys, Low temperature research, Tensile properties, Ductility, Toughness, Compatability, Welds, Hydrogen, Oxygen, Test equipment, Cryostats, Brittleness, Fatigue (Mechanics), Experimental data, Pressure vessels, Liquid rocket propellants, Helium, Nitrogen, Fluorine, Tables.

An up-to-data review of metals and alloys suitable for cryogenic aerospace structural applications has been made. The mechanical properties of austenitic stainless steels, other steels, aluminum alloys, titanium alloys, nickel alloys and cobalt alloys from +78 to -423 F are presented, including tensile and yield strengths, elongation and notch/tensile ratios. Mechanical properties of weldments are also presented. The question of notch toughness and the notch acuity factor is discussed with respect to low temperature tensile testing. Compatibility with the liquid gases is discussed and alloys most suitable for containing liquid oxygen and hydrogen in aerospace vehicles are recommended. (Author)

AD-429 296 Div. 17
OTS price $2.60

Aerojet-General Corp., Azusa, Calif.
STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by R. B. Setterlund. Jan 64, 17p. Rept. no.
0414 02 2Q
Contract DA04 495ORD3069
Unclassified report

Descriptors: (*Steel, Corrosion), (*Protective treatments, Steel), Nickel alloys, Stresses, Fracture (Mechanics), Plastic coatings, Isocyanate plastics, Epoxy plastics, Chromates, Zinc coatings, Environmental tests.

The present program is directed to the study of the stress-corrosion behavior of 18%-nickel maraging steel with emphasis on compositional variation, effect of environmental temperature, and study of electropotential changes. It is intended to: first, determine the extent of the stress-corrosion problem in 18%-nickel maraging steel by testing four additional heats; second, compare the susceptibility of maraging steel with conventional ultra-high-strength steels; and, third, to investigate further, by electropotential methods, the cause of failure of 18%-nickel maraging steel. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-428 596 Div. 18, 5
OTS price $14.50

RCA Defense Electronic Products, New York.
CIVIL DEFENSE PUBLIC ALERT AND WARNING BY RADIO. Interim rept. no. 1,
by L. Siegel. 4 Nov 63, 1v. Rept. no. CR63 419 8
Contract OCD OS63 54

Unclassified report

Descriptors: (*Civil defense systems, Radio communication systems), (*Radio communication systems, Civil defense systems), Feasibility studies, Costs, Operations research, Effectiveness, Electronic countermeasure, Reliability, Radio broadcasting, Warning systems.

The use of radio for alerting and warning the public of civil defense emergencies is shown to be technically feasible at a per capita expenditure of less than $10. Standard broadcast radio is the basis of the warning element and either standard broadcast or low frequency radio is the basis of the alert element. Several optional system configurations are described, of different cost and effectiveness, to realize rapid and responsive public warning by radio. A program is recommended to carry on the development of a comprehensive radio warning system, based on the use of the public's broadcast radio receivers operated in conjunction with alert receivers to be provided. (Author)

AD-428 900 Div. 18
OTS price $5.60

Hudson Inst., Harmon-on-Hudson, N. Y.
ARMS CONTROL AND CIVIL DEFENSE. ANNEX I. ''THE QUESTION OF CRISIS EVACUATION,''
by Jeremy J. Stone. 20 Aug 63, 47p. Rept. no. 216RR1
Contract ACDA IR10

Unclassified report

Descriptors: (*Disarmament, Effectiveness), (*Civil defense systems, Abandonment), (*Abandonment, Civil defense systems), Costs, Population, Density.

Contents: The Purpose of Crisis Evacuation, Dangers of Various Crisis Evacuation Policies, Problems Associated with Purchasing or Maintaining an Evacuation Capability, Evacuation Effectiveness, Arms Control and Arms Race Considerations, and Conclusions.

AD-428 901 Div. 18
OTS price $4.60

Hudson Inst., Harmon-on-Hudson, N. Y.
ARMS CONTROL AND CIVIL DEFENSE. ANNEX IV. THE DOMESTIC POLITICAL INTERACTIONS,
by Anthony J. Wiener. 20 Aug 63, 39p. Rept. no. HI216RR4
Contract ACDA IR10

Unclassified report

Descriptors: (*Civil defense systems, Disarmament), (*Disarmament, Civil defense systems), Public opinion, Public relations, Political science, Foreign policy, Effectiveness, Reviews.

The effects are analyzed of civil defense on the domestic environment for arms control. Possible consequences of civil defense programs for the goals of arms control, and disarmament policies are considered regarding those that stem from public opinion and domestic politics. (Author)

AD-428 988 Div. 18
OTS price $2.60

Hudson Inst., Harmon-on-Hudson, N. Y.
ARMS CONTROL AND CIVIL DEFENSE. ANNEX III. CIVIL DEFENSE PROGRAMS IN THE PRESENT WORLD,
by Elisabeth Crawford. 20 Aug 63, 19p. Rept. no. H1 216RR111
Contract ACDA IR10

Unclassified report

Descriptors: (*Civil defense systems, Disarmament), (*Disarmament, Civil defense systems), Urban areas, Shelters, Training, Construction, Effectiveness, Reviews.

Current civil defense plans and preparations are surveyed to provide a factual background for analysis of civil defense and arms control in the 1960's. Emphasis is placed on the civil defense programs of the United States, Europe and the Soviet Union. (Author)

AD-429 306 Div. 18
OTS price $4.60

RAND Corp., Santa Monica, Calif.
AN EXPERIMENT IN AIRCRAFT STATUS PREDICTION,
by Robert E. Johnson. 24 May 61, 37p. Rept. no. RM2731
Contract AF49 638 700

Unclassified report

Descriptors: (*Aircraft, Scheduling), (*Guided missiles, Scheduling), Operations research, Mathematical prediction, Probability, Maintenance, Management engineering, Air force operations, Jet fighters, Mathematical models, Operation, Guided missiles (Surface to surface), Decision making.

This study describes a method of aircraft status prediction and an experiment based on certain Air Force data. One aspect of weapon system management is the ability to control hour-to-hour and day-to-day readiness levels for aircraft and missiles. This research memorandum tries to develop a method for prediction purposes, one that would be useful for periods of hours rather than days. The author relies on a Markov chain method, finding it better than simple reliance on either the present status of the unit's aircraft or on some average status pattern. The method takes advantage of information about the future provided by: (1) schedule relating to flying and to periodic maintenance, (2) historical data, and (3) current status information. It is suggested in conclusion that certain systems now under development would be benefited by taking into account the needs of status prediction at such times as the systems become operational. (Author)

Division 19 - NAVIGATION

19. NAVIGATION

AD-428 446 Div. 19, 25
OTS price $6.60

Boeing Scientific Research Labs., Seattle, Wash.
LECTURES ON THE PROBLEM OF SPACE AND TIME IN EINSTEIN'S THEORY OF GRAVITATION,
by Claus Muller. Oct 63, 66p. Rept. no. D1 82 0312; Mathematical note no. 328
Unclassified report

Also available from the author.

Descriptors: (*Space navigation, Theory), Relativity theory, Gravity, Celestial mechanics, Differential geometry, Algebraic topology.

AD-428 933 Div. 19, 8
OTS price $9.10

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION AN/GRN-14 ( ) POSITION FIXING NAVIGATION SYSTEM.
Jan 64, 1v.
TAC TR62 2 Unclassified report

Descriptors: (*Position finding, Navigation), (*Radio beacons, Position finding), (*Low frequency, Radio beacons), Aircraft, Radio transmitters, Radio receivers, Display systems, Weight, Volume, Radiofrequency interference, Noise (Radio), Performance (Engineering), Aerial reconnaissance, Maintenance, Environmental tests, Landing aids, Bombing.

This test was conducted to determine the degree of accuracy that tactical high performance aircraft could be positioned in a forward battle area using the AN/GRN 14 ( ) Position Fixing Navigation System, a continuous wave-low frequency-hyperbolic navigation system. Three tactical aircraft participated in this test; a C-130 for tactical troop carrier operations, an RB-66 for tactical photo reconnaissance and an RB-57 for tactical weapons delivery. (Author)

AD-429 007 Div. 19, 25
OTS price $3.60

Birmingham U. (Gt. Brit.).
THERMODYNAMICS OF ALLOYS TIN-SOLUTION CALORIMETRY STUDIES OF LIQUID TIN-SILVER ALLOYS AND OF RARE EARTH MATERIALS.
Final technical rept., 1 Dec 62-30 Nov 63,
by J. N. Pratt and A. W. H. Morris. 30 Nov 63, 1v.
Contract DA91 591EUC2729
Unclassified report

Descriptors: (*Alloys, Thermodynamics), (*Silver alloys, Heat of solution), (*Tin alloys, Heat of solution), Rare earth elements, Cerium, Lanthanum, Praseodymium, Ytterbium, Calorimeters, Liquid metals, Cerium alloys.

A tin-solution calorimeter, described in earlier reports, was employed for the measurement of enthalpies of solution and formation of various alloys. Using a technique permitting the direct measurement of the partial quantities for each component, detailed values were obtained for the heats of solution of tin in a range of liquid silver-tin alloys; some corresponding values for the silver partial and for the integral quantities have also been obtained. Studies of the heats of solution of rare earth materials in liquid tin continued. New measurements were made with ytterbium and praseodymium, and earlier values for cerium and lanthanum were recalculated in the light of more recent specific heat data. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-427 948 Div. 20
OTS price $1.10

Catholic U. of Brazil, Rio De Janeiro.
CHARGE STORAGE AND IRRADIATION EFFECTS IN SOLID DIELECTRICS.
Rept. for July 61-June 62,
by Preston V. Murphy. 1963, 3p.
Grant AF AFOSR61 140
AFOSR 3178 Unclassified report

Descriptors: (*Radiation damage, Materials), Polarization, Dielectrics, Electrets, Paramagnetic resonance, Theory, Abstracts, Gamma rays.

AD-428 117 Div. 20, 16
OTS price $2.60

Hudson Inst., Harmon-on-Hudson, N. Y.
SPECIAL ASPECTS OF ENVIRONMENT RESULTING FROM VARIOUS KINDS OF NUCLEAR WARS. PART 11. ANNEX 111. APPLICATION OF INPUT-OUTPUT ANALYSIS TO A HOMEOSTATIC ECOSYSTEM,
by Robert U. Ayres. 8 Jan 64, 26p. Rept. no. H1 303RRA111
Contract OCD OS62 218, Task 3511A
Unclassified report

Descriptors: (*Nuclear warfare, Environmental tests), (*Ecology, Simulation), Models (Simulations), Nuclear explosion damage, Radioactive fallout, Survival, Bacteria, Climatology, Anticrop agents, Toxicity, Population, Closed ecological system, Computer logic, Birds, Arthropods, Animals, Nematodes, Plants (Botany), Insects, Mammals.

AD-428 158 Div. 20
OTS price $1.60

Rand Corp., Santa Monica, Calif.
EFFECTS OF NEUTRONS FROM HIGH-ALTITUDE DETONATIONS,
by P. Tamarkin. Nov 63, 13p. RM3932PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Neutrons, Nuclear explosion damage), (*Neutrons, High altitude bombing), (*High altitude bombing, Neutrons), Sources, Detonations, Decay schemes, Measurement, High altitude, Ionization, Radio waves, Propagation, Fluxes (Fusion), Very low frequency, Protons, Thermal neutrons, Detection, Nuclear explosions.

Consequences of the decay of neutrons from high-altitude nuclear detonations in equatorial regions are examined. Sample temporal variations of night-time D-layer ionization profiles resulting from direct precipitation of neutron-decay betas are presented for pure fission and for 1 KEV thermal source-neutron spectra. There are large differences, between the two cases, in the maximum amount of ionization produced and number of seconds required to attain maximum ionization. These differences emphasize the need to consider actual spectra of neutrons from high-altitude detonations in the study of the VLF propagation anomalies they produce. Under certain stated conditions the energetic protons from the decay of similarly energetic neutrons can cause more D-layer ionization than do the decay betas, with especial consequences for affecting VLF propagation over day-lit paths. A similar comparison for 12 to 14 MEV trapped protons leads to the conclusion that 10 to the twenty-fifth power neutrons set free with energies between 12 and 14 MEV would produce a differential directional flux equal to that measured in the region near L = 2.5. (Author)

AD-428 201 Div. 20
OTS price $2.25

Massachusetts Inst. of Tech., Cambridge.
PROMPT ACTIVATION ANALYSIS FOR BORON AND LITHIUM,
by Lincoln Clark, Jr. and Norman C. Rasmussen.
Oct 63, 92p. SR2; Rept. no. NE42
Contract AF19 604 7492, Proj. 4608, Task 460801
AFCRL 63 575 Unclassified report

Master's Thesis.

Descriptors: (*Radioactivation analysis, Chemicals), Boron, Lithium, Theory, Radiation measurement systems, Instrumentation, Standards, Neutron reactions, Nuclear engineering.

Activation analysis for boron and lithium is not possible in the usual sense because neither one becomes radioactive under neutron irradiation. However, both have large thermalneutron cross sections and activation analysis is possible if one measures the prompt particles emitted. Based on an analysis of the several types and sources of radiation which would be experienced, including background, a gas-flow proportional counter was used. The device was calibrated by use of aluminum standards containing known amounts of boron or lithium. The difference in the energy spectra makes it possible to determine the relative amounts of these two elements and, in conjunction with the count rate, to find the concentration of each in aluminum. Approximate analyses of aluminum and graphite unknowns were made in the region of one part per million boron plus lithium. An analysis of background effects indicates that the method should be applicable at concentrations which are at least a factor of ten or one hundred lower. (Author)

AD-428 207 Div. 20, 29
OTS price $3.50

Army Natick Labs., Mass.
HANDBOOK OF PHOTONUCLEAR REACTIONS,
Comp. by David O. Hunt, Ari Brynjolfsson and Raymond D. Cooper. Dec 63, 1v.
ANL TR FD1 Unclassified report

Descriptors: (*Handbooks, Photonuclear reactions), (*Photonuclear reactions, Handbooks), Nuclear cross sections, Gamma-ray cross sections, Gamma neutron reactions, Gamma proton reactions, Purification, Radiation effects, Food, Preservation.

A compilation was made of the data which would be most useful in calculating the activities produced in food by high energy electrons or gamma rays. The known isotopes of each element are listed with their atomic masses, half lives, and methods of decay. Photoneutron and photoproton cross sections are shown and both theoretical and experimental threshold values are listed. References are included for all data. The appendixes include a short description of the bremsstrahlung cross sections and a list of the common radioactive isotopes found in food irradiated by high energy electrons. (Author)

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-428 214 Div. 20
OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MATERIAL FROM THE WORKING CONFERENCE ON SLOW-NEUTRON PHYSICS (DECEMBER 7-12, 1961) (SELECTED ARTICLES).
14 Jan 64, 339p.
FTD TT64 22 Unclassified report

Trans. from Materialy Rabochego Soveshchaniya Po Fizike Medlennykh Neytronov (7-12 Dekobrya 1961 Goda), Ob''edinennyy Institut Yadernykh Issledovaniy, Dubna, pp. 3-11, 20-27, 28-33 and 47-240, 1962.

Descriptors: (*Symposia, Nuclear physics), (*Nuclear physics, Symposia), Neutron scattering, Thermal neutrons, Beta decay, Measurement, Resonance scattering, Theory, Test equipment, Spectroscopy, Neutron cross-sections, Inelastic scattering, Neutron activation, Gamma-neutron reactions.

AD-428 216 Div. 20
OTS price $1.60

Institute for Defense Analyses, Washington, D. C.
COMPARISON OF RAINIER RESULTS WITH RAND THEORY FOR CRATERING BY A SURFACE BURST,
by F. B. Porzel. Apr 62, 11p. TN62 15;UBG 62 381
Contract SD50
Unclassified report

Descriptors: (*Nuclear explosions, Cratering), (*Cratering, Surface burst), Theory, Underground explosions, Pressure.

Contents: Comparison with crushing radius on rainier, Comparison with pressure-distance curve on rainier.

AD-428 227 Div. 20
OTS price $1.60

Institute for Defense Analyses, Washington, D. C.
THE GNOME EXPLOSION AND ITS BEARING ON NUCLEAR TEST DETECTION,
by Joseph W. Berg, Jr. Mar 62, 7p. TN 62 11; UBG62 347
Contract SD50
Unclassified report

Descriptors: (*Nuclear explosions, Underground explosions), Explosion effects, Data, Seismographs, Detection, Recording system, Wave transmission.

The GNOME nuclear explosion was detonated in salt underground. The object of this report is to assess the early analyses of the seismic data from the GNOME explosion in its relation to nuclear test detection. To do this, the report is divided into three sections: I. Source, II. Propagation Paths and Recording Sites, and III. Effects on Geneva Criteria. (Author)

AD-428 230 Div. 20, 13
OTS price $1.75

Oak Ridge National Lab., Tenn.
A STUDY OF THE RADIATION SHIELDING CHARACTERISTICS OF BASIC CONCRETE STRUCTURES AT THE TOWER SHIELDING FACILITY,
by V. R. Cain. 24 Jan 64, 66p. Rept. no. 3464
Contract OCD OS62 145
Unclassified report

Descriptors: (*Radiation weapons, Shielding), (*Shielding, Radiation weapons), (*Concrete, Shelters), Simulation, Effectiveness, Nuclear reactors, Thickness, Instrumentation, Dose rate, Gamma rays, Thermal neutrons, Fast neutrons, Civil defense systems, Neutron flux.

A series of experiments were performed to investigate the protection afforded by various typical structures against prompt weapons radiation. Radiation-intensity measurements were made at the Tower Shielding Facility in two concrete-shielded bunkers and in an interconnecting tunnel. Prompt weapons radiation was simulated by the Tower Shielding Reactor II (TSR-II), which was operated 100 ft above the ground. The distance between the reactor and the bunkers was approximately 700 ft. The bunkers were each 12-ft cubes and were constructed so that the shield thickness on the front face of one and on the top face of the other could be varied in 4-in. steps from 0 to 20 in. The thickness of concrete and dirt surrounding all other faces was sufficient to make them black to incident radiation. The gamma-ray and fast-neutron dose rates and thermal-neutron fluxes measured at various positions within the bunkers and in the tunnel and the pulse-height spectra from a 3-in. sodium iodide crystal determined at one position in the top bunker and one position in the tunnel are reported. (Author)

AD-428 231 Div. 20
OTS price $13.00

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENT OF GAMMA-RAY SPECTRA FROM THERMAL-NEUTRON CAPTURE,
by John M. Neill, Norman C. Rasmussen, and Theos J. Thompson. Aug 63, 171p. SR1; NE37
Contract AF19 604 7492, Proj. 4608, Task 460801
AFCRL 63 341 Unclassified report

Descriptors: (*Gamma-ray spectra, Measurement), (*Radioactive isotopes, Gamma-ray spectra), Neutron capture gamma rays, Photographic emulsions, Test methods, Digital computers, Instrumentation, Scandium, Rhodium, Iridium, Nuclear energy levels, Spectrum analyzers, Nuclear engineering, Dysprosium.

An investigation of the gamma-ray spectra of several isotopes from thermal-neutron capture has been carried out. The isotopes irradiated are Sc45, Ir191, Ir193, Rh103, Dy161, Dy164, and Ho165. The technique of using the bent crystal spectrometer has been refined by means of improved development of the photographic emulsion used as a detector, by means of a formalized data-taking procedure and by the use of a digital computer to analyze the results in a consistent fashion. The instrument has been used to survey the low-energy photons from neutron capture by natural scandium, iridium and rhodium. A scintillation pair spectrometer is coupled to a two-parameter analyzer and has been used in coincidence studies of neutron-capture gamma rays from Dy161, Dy164 and Ho165. Its operation has been aided by the use of a digital computer to perform data reduction. An attempt has been made to perform stripping on the complex gamma-ray spectra obtained. The results have been compiled and nuclear energy level schemes have been proposed for Sc46, and somewhat tentatively for Dy165 and Ho166. Possible aditions to the present nuclear energy level schemes of Rh104 and Dy162 are also presented. (Author)

AD-428 271 Div. 20, 30
OTS price $2.60

Electro-Mechanics Co., Austin, Tex.
EQUIPMENT FOR MEASUREMENT OF MAGNETIC FIELD VAR-

IATIONS FOR DASA PROJECT 6.5A,
by F. J. Morris, C. R. Coale, W. E. A. Ruska, and E. J. Chernosky. 30 Apr 63, 18p.
Contract AF19 604 5520, Proj. 8601, Task 860102
AFCRL 63 939 3 Unclassified report

Descriptors: (*Magnetometers, Design), Magnetic fields, Measurement, Geophysics, Test equipment, Instrumentation, Measuring devices, Nuclear explosions, High altitude.

Magnetometers were constructed for the purpose of instrumenting two field magnetic and telluric observatories. The purpose of these observatories, established and operated in the Pacific area, was to measure and record geomagnetic phenomena corresponding to the high-altitude nuclear test series in 1962. The stations were manned and data was successfully taken for all events specified to be of interest by the contract monitor. (Author)

AD-428 415 Div. 20
OTS price $1.10

Catholic U. of Brazil, Rio de Janeiro.
THE FORMATION AND DISCHARGE OF CARNAUBA WAX ELECTRETS IN NUCLEAR RADIATION FIELDS,
by Preston V. Murphy. 1961, 4p.
Grant AF AFOSR61 140
AFOSR 3467 Unclassified report

Descriptors: (*Electrets, Nuclear particles), Gamma rays, Polarization, Paramagnetic resonance, Nuclear spins, Electrons, Photoconductivity.

AD-428 549 Div. 20, 25
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ATOMIZATION OF STAINLESS STEEL AND TANTALUM BY IONS OF DEUTERIUM AND KRYPTON WITH AN ENERGY OF 5-30 KEV,
by M. I. Guseva. 19 Nov 63, 15p.
FTD MT63 6 Unclassified report

Trans. from Radiotekhnika i Elektronika, 7:9, pp. 1680-1685, 1962.

Descriptors: (*Isotope separation, Deuterium), (*Atomization, Stainless steel), Tantalum, Krypton, Vacuum apparatus, Gas discharges, Ions, Integrators, Measurement, Plasma medium, Particle accelerators, Energy.

AD-428 607 Div. 20
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
EVALUATION OF THE OXALIC ACID DOSIMETER FOR MEASURING MEGARAD DOSES OF GAMMA RADIATION,
by E. F. Connolly and L. H. Gevantman. 5 Dec 63, 14p.
NRDL ER14 Unclassified report

Descriptors: (*Dosimeters, Oxalid acids), (*Gamma rays, Measurement), Materials, Dosage, Errors, Tables, Dose rates, Effectiveness, Operation, Reliability.

The oxalic acid dosimeter was tested for accuracy according to a procedure proposed by The American Society for Testing Materials, in three gamma dose ranges: 1.6-6, 6-18 and 18-50 megarads. The results were found to agree within a plus or minus 5-10 % experimental error with values extrapolated from measurements by the Fricke dosimeter. (Author)

AD-428 636 Div. 20
OTS price $1.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
INVESTIGATION OF THE OXALIC ACID CHEMICAL DOSIMETRY PROCEDURE FOR MEASURING GAMMA RADIATION,
by A. L. Glass. 13 Jan 64, 15p.
NAEC AML 1854 Unclassified report

Descriptors: (*Radiation measurement systems, Gamma rays), Acids, Spectrophotometers, Cobalt, Radioactive isotopes, Test methods.

An investigation of an oxalic acid chemical dosimetry procedure for determining high levels of gamma radiation emanating from a Co-60 source, is described. The procedure recommended herein is accurate and easily performed with common laboratory equipment. It can be utilized for the measurement of gamma radiation in the range of 1.6 x 10 to the 6th power to 6 x 10 to the 7th power rads. (Author)

AD-428 645 Div. 20
OTS price $5.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
VARIATION IN REFLECTANCE OF VEGETATION AND SOILS CAUSED BY AN UNDERGROUND NUCLEAR EXPLOSION.
Final technical rept.
1 Nov 62, 1v.
Unclassified report

Descriptors: (*Underground explosions, Detection), Plants (Botany), Damage, Reflection, Soils, Theory, Instrumentation, Spectrophotometers, Nuclear explosions.

AD-428 706 Div. 20
OTS price $1.10

Technical Operations, Inc., Burlington, Mass.
RESEARCH ON CIRCULATION IN NUCLEAR CLOUDS,
Final rept.,
by H. G. Norment. 1 Dec 63, 6p. Rept. no. TO B63 102A
Contract OCD OS62 186, OCD Task 3113A
Unclassified report

Descriptors: (*Atomic clouds, Mathematical models), (*Mathematical models, Atomic clouds), Programming (Computers), Particle trajectories, Simulation, Theory, Fluid dynamic properties, Radioactive fallout.

Theoretical evaluations of circulation models were made, and placed on testing the models' capacities to accurately describe observed phenomena and on the feasibility of their use in a large-scale particle motion simulation computer program. Additional sources of experimental circulation data were found. Data adequate to test, at least in part, the mathematical models and provide information necessary for model calibration were collected from these sources. Particle motion simulations on a pilot scale were made; trajectory stability problems encountered in the simulation calculations were studied and solutions to these problems have been found. (Author)

AD-428 882 Div. 20, 10
OTS price $12.50

Babcock and Wilcox Co., Lynchburg, Va.
SUMMARY REPORT OF THERMIONIC CONVERTER INPILE EXPERIMENTS.
by W. L. Orr, H. J. Worsham and R. M. Ball.
Mar 63, 1v. Rept. no. 1267
Contract NObs84823
Unclassified report

Descriptors: (*Thermionic converters, Nuclear reactors). Temperature, Distribution, Experimental data, Heat transfer, Perturbation theory, Generators, Electric power production, Effectiveness, Measurements, Configuration, Calibration, Design.

As part of the program for the development of a reliable vaporfilled thermionic converter for use with a nuclear heat source, a series of inpile experiments was conducted. The inpile experimental program consisted of two phases. The first phase was a series of inpile heat transfer experiments in which a nuclear-fueled emitter was operated at the temperatures and heat flux required by the thermionic converter. Emitter temperature distribution data with electrical and nuclear heat sources were similar. No adverse temperature perturbations were introduced by the nuclear fuel. The second phase was the successful inpile operation of the RCA Converter, Type A-1197A, for 300 hours in the Lynchburg Pool Reactor. A maximum electrical power output of 155 watts (2.58 watts/sq. cm) was produced at a computed efficiency of 10.3%. (Author)

AD-428 883 Div. 20
OTS price $5.60

Babcock and Wilcox Co., Lynchburg, Va.
A SUMMARY REPORT OF THE USE OF THERMIONIC CONVERTERS IN A NATURAL CIRCULATION BOILING WATER REACTOR,
by W. L. Orr. July 62, 50p. Rept. no BAW1261
Contract NOBs84823
Unclassified report

Descriptors: (*Thermionic converters, Design), (*Boiling water reactors, Reactor fuels), Uranium compounds, Thorium compounds, Oxides, Nuclear resonance, Transport properties, Equations, Cathodes, Anodes, Buckling (Neutron density), Circulating fuel reactors, Integrals.

Studies made concerning the use of thermionic converters in a natural circulation, boiling water reactor are presented. The first two phases of the study were concerned with the reactivity available with Plasma-Triode and Ball-of-Fire converters. The third phase included a nuclear parameter study of two pressure tube concepts using the Ball-of-Fire converter. The conceptual design of a 1-MW-e natural circulation thermionic reactor was developed using a pressure tube fuel element concept. (Author)

AD-428 884 Div. 20
OTS price $3.00

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A LOW TEMPERATURE VAPOR FILLED THERMIONIC CONVERTER FOR NUCLEAR APPLICATIONS.
Summary technical rept. 28 May 62-30 Jan 63,
by G. Y. Eastman, W. E. Harbaugh, R. J. Buzzard, W. L. Orr and H. J. Worsham. Apr 63, 1v.
Contract NObs84823, Proj. SF013 0624, Task 2853
Unclassified report

Descriptors: (*Thermionic converters, Nuclear reactors), (*Nuclear reactors, Thermionic converters), Heat transfer, Vapors, Experimental data, Emissivity, Temperature, Distribution, Calibration, Electric power production, Measurements, Reactor cores, Configuration, Design, Theory, Analysis.

As part of the program for the development of a reliable vaporfilled thermionic converter for use with a nuclear heat source, a series of inpile experiments was conducted. The program consisted of two phases. The first phase was a series of inpile heat transfer experiments in which a nuclear-fueled emitter was operated at the temperatures and heat flux required by the thermionic converter. Emitter temperature distribution data with electrical and nuclear heat sources were similar. No temperature perturbations were introduced by the nuclear fuel. The second phase was the successful inpile operation of the RCA Converter, Type A-1197A, for 300 hours in the Lynchburg Pool Reactor. A maximum electrical power output of 155 watts (2.58 watts/cmsq cm) was produced at a computed efficiency of 10.3%. (Author)

AD-428 941 Div. 20
OTS price $2.60

Atomics International, Canoga Park, Calif.
CLAD CARBIDE NUCLEAR FUEL THERMIONIC POWER MODULES.
Quarterly rept. no. 3, 15 Sep-15 Dec 63,
by C. K. Smith. Dec 63, 17p. Rept. no. AI9362
Contract AF33 657 10876, Proj. 8173, Task 817305 23
Unclassified report

Descriptors: (*Thermionic emission, Nuclear reactors), (*Thermionic converters, Nuclear reactors), (*Nuclear reactors, Thermionic converters), (*Reactor fuels, Carbides), Cladding, Zirconium alloys, Zirconium compounds, Uranium alloys, Carbon alloys, Tungsten, Rhenium, Cesium, Vapors, Reactor fuel cladding.

The general objective is to evaluate a clad carbide emitter, thermionic power module which simulates nuclear reactor installation, design, and performance. The module is an assembly of two series-connected converters with a single common cesium reservoir. The program goal is 500 hr cumulative operation at a power density of 7 watts/sq. cm. and an efficiency of 12%. This report describes progress made during the third program quarter, including: (1) Completion of fabrication of all clad fuel structures; (2) Completion of heat treatments and subsequent initiation of metallurgical evaluations of clad fuel specimens; (3) Completion of fabrication of all module components; and (4) Assembly of the module. At completion of module assembly, a rigorous leak-check revealed the presence of a very slight leak in one end of the collector insulator tube. (Author)

AD-428 970 Div. 20, 30
OTS price $.75

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIATION PHYSICS: ITS IMPACT ON INSTRUMENTATION,
by Rudy C. Beavin. Sep 63, 18p.
ASD TDR63 697 Unclassified report

Presented at the ''ASD 1963 Science and Engineering Symposium'', 18-19 Sep 63.

Descriptors: (*Radiation chemistry, Instrumentation), (*Physics, Radiation chemistry), Flight control systems, Low altitude, Altimeters, Fuel meters, Fuels, Measurement, Experimental data, Theory, Radiation measurement systems, Analysis, Gamma rays, Radioactive isotopes.

Presented is an argument for exploiting radiation physics for the solution of problems in the instrumentation area. A brief review is given of basic physics connected with radiation. Several problems in the flight control area are stated and possible solutions presented using radiation physics concepts. Three of these problems, low-altitude altimetry, high altitude altimetry, and fuel mass measurement, are examined in detail and experimental and analytical results given. A program philosophy and the establishment of an in-house experimental facility for exploitation of radiation physics are also reported. (Author)

AD-429 081 Div. 20
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A STUDY OF (np) AND (n, np) REACTIONS ON HEAVY ISOTOPES OF NICKEL,
by A. K. Val'ter and V. Yu. Gonchar. 19 Nov 63, 13p.
FTD MT63 5 Unclassified report

Trans. from AN SSSR, Izvestiya, Seriya Fizicheskaya, (Russian), 26:8, pp. 1079-1084, 1962.

Descriptors: (*Nickel, Nuclear cross sections) (*Isotopes, Nickel), (*Nuclear cross sections, Nickel), Proton cross sections, Neutron cross sections, Half life, Laboratory equipment, Cobalt, Radioactive isotopes, Radioactive decay.

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-428 082 Div. 22
OTS price $1.60

Atlas Chemical Industries, Inc., Tamaqua, Pa.
(No title).
Final summary rept.,
by R. McGirr and R. Sager. Nov 63, 9p.
Contract DA28 017ORD4706
Unclassified report

Descriptors: (*Explosive initiators, Electronic switches), Military requirements, Specifications, Delay elements (Explosive), Explosive actuators, Production, Tests, Design, Manufacturing methods, Failure (Mechanics), Scheduling.

This report describes the work done in producing specific quantities of seven (7) types of squib switches. The switches were manufactured and delivered after passing preproduction and acceptance testing. These switches were manufactured in accordance with all applicable specifications. (Author)

AD-428 312 Div. 22
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANTITANK PROJECTILES,
by V. Nadin. 23 Aug 63, 7p.
FTD TT63 643 Unclassified report

Trans. from Voyennyye Znaniya, No. 4, pp. 23-24, 1963.

Descriptors: (*Shaped charges, Antitank ammunition), (*Subcaliber projectiles, Antitank ammunition), (*Armor piercing ammunition, Antitank ammunition), (*Antitank ammunition, Projectiles), Armor, Tanks (Combat vehicles).

AD-428 534 Div. 22
OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
A METHOD FOR BALLISTICALLY TESTING XM94 PRIMERS,
by Louis Silberman and Donal Ellington. Jan 64, 9p.
AED TM1322 Unclassified report

Descriptors: (*Primers, Test methods), Small arms, Small arms ammunition.

Studies are reported with a special .45-caliber gun which demonstrated a simple and economical technique for measuring functional adequacy of these primers in a system similar to that employed in the end item. The test appears very sensitive to primer quality. The weapon chamber can be modified to fire several different primer-propellant container combinations. Propellant containers were used with XM94 and XM94E1 primers for this report. The output of the primer-propellant container is determined by measuring muzzle velocity of the .45-caliber bullet. (Author)

AD-428 747 Div. 22
OTS price $2.60

Springfield Armory, Mass.
ENGINEERING DEVELOPMENT AND OPERATIONAL CHARACTERISTICS OF RIFLE, 7.62mm, M14E2,
by Paul R. Landry. 18 Dec 63, 15p.
Unclassified report

Descriptors: (*Small arms, Performance (Engineering)), (*Automatic weapons, Performance (Engineering)), Design, Gun components, Handling, Firing tests (Ordnance), Physical properties.

Current information is presented on the design characteristics of rifle, 7.62mm, M14E2. (Author)

AD-428 818 Div. 22
OTS price $12.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INNOVATIONS IN EQUIPMENT AND TECHNIQUES FOR BLASTING (NAUCHNO-TEKHNICHESKOYE GORNOYE OBSHCHESTVO),
by Pod Redaktsiyey, V. A. Assonova and L. A. Paporotskogo. 22 Nov 63, 163p.
FTD TT63 293 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Literatury Po Gornomu Delu, pp. 1-127, Moskva 1962.

Descriptors: (*Detonators, Design), (*Demolitions, Handling), Explosives initiators, Explosive trains, Explosive materials, Explosions, Mining engineering, Demolition, Detonations, Electric detonators.

This collection contains articles on new blasting methods and equipment, ways of protecting electric detonators from stray currents, methods of improving short-period delay explosion and other problems of a similar nature. The book is designed for the engineering and technical personnel of mining establishments, research workers and project engineers, and also for students at mining colleges and technical schools. (Author)

AD-429 155 Div. 22, 27
OTS price $3.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
DESCRIPTION OF LAW SYSTEM AND CONTROL OF EROSION IN ROCKET MOTOR,
by Seymour Kaplowitz. Jan 64, 25p.
AED TM1330 Unclassified report

Descriptors: (*Antitank ammunition, Rockets), (*Rocket motors (Solid propellant), Erosion), High explosive ammunition, Shaped charges, Performance (Engineering), Design, Electric fuzes, Velocity.

One of the newest limited war weapons in the Army inventory is the 66mm LAW M72. The LAW is a lightweight shoulder-fired rocket which provides the individual infantryman with close-in antitank defense and the ability to defeat hard targets. It is a single-shot throwaway weapon. The launcher serves as the protective package for the rocket until the weapon is opened and fired, after which the launcher can be discarded. (Author)

AD-429 215 Div. 22, 1
OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
AIRCRAFT QUALIFICATION INFORMATION PACKAGE GLADEYE WEAPON SYSTEM. (BOMB DISPENSER MK 4 MOD 0 AND BOMB DISPENSER CANISTER MK 2 MOD 0),
by Dennis E. Glendenning. Dec 63, 26p.
NOTS TP3395; NAVWEPS 8439 Unclassified report

Descriptors: (*External stores, Bombs), (*Bomb ejectors, Compatibility), Release mechanisms, Bomblets, Ejection, Naval aircraft, Performance (Engineering), Bomb racks, Containers.

A summary of the information necessary for an aircraft manufacturer or other qualified agency to establish compatibility and performance characteristics of an aircraft loaded with a Gladeye Dispenser System is presented. This report should be used as a basis for any such study. (Author)

AD-429 314 Div. 22
OTS price $4.60

Harry Diamond Labs., Washington, D. C.
FUZE, PIBD, T278E8.
Summary rept.,
by Louis Richmond. 30 Oct 63, 47p.
HDL Proj. 43500
HDL TR1155 Unclassified report

Descriptors: (*Fuzes (Ordnance), Performance (Engineering)), (*Projectile fuzes, Design), Base detonating fuzes, Point initiating fuzes, Arming devices, Sensitivity, Delay elements (Explosive), Performance tests, Antitank ammunition.

Development and performance of the T278E8 point-initiated, base-detonating (PIBD) fuze are summarized. The fuze (standardized M530A1) was designed primarily for use in the M371 90-mm recoilless HEAT cartridge, but may also be used in other low and intermediate velocity HEAT shell whose drag does not exceed about 20 g. The performance characteristics of the T278E8 are compared with those of the M509E6 and M530 standard electric PIBD fuzes. These fuzes, which have been available for HEAT ammunition in the 76- to 120-mm range, are essentially similar in basic design and operation to the T278E8. The major difference is that the T278E8 fuze provides a minimum of 30 ft delayed arming in the M371 round, a feature that is not attainable by the other standard PIBD fuzes. (Author)

AD-429 317 Div. 22, 27
OTS price $7.60

Aerospace Information Div., Washington, D. C.
ELECTROSTATIC ROCKET TECHNOLOGY. COMPREHENSIVE REPORT ON SOVIET PERIODICAL LITERATURE.
10 Dec 63, 70p.
AID P63 121 Unclassified report

Descriptors: (*Rocket research, Ion engines), (*Abstracts, Rocket research), (*Reports, Rocket research), (*Ion engines, Electrostatics), Models (Simulations), Surface propulsion, Cesium, Ionization, Tungsten, Porous metals, Ionic current, Ion beams, Space charges, Plasma oscillations, Secondary emission, Ion sources, Ion exchange, Reviews, Periodicals, Bibliographies, Electron bombardment, Alkali metals.

Contents: Laboratory Model of an Ion-Propulsion Motor; Ion Production; Ion Optics; Ion Beam Neutralization; Charge Exchange; and Secondary Emission.

23. PERSONNEL AND TRAINING

No Entries

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

No Entries

25. PHYSICS

AD-427 967 Div. 25, 9
OTS price $8.10

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
A BASIC STUDY OF SLENDER CHANNEL ELECTROGASDYNAMICS,
by B. Kahn and M. C. Gourdine. Nov 63, 79p.
Contract AF33 657 10832, Proj. 7116, Task 7116 02
ARL 63 205 Unclassified report

Report on Energy Conversion Research.

Descriptors: (*Magnetohydrodynamics, Electric field), (*Electric field, Magnetohydrodynamics) Gas ionization, Gas flow, Cylindrical bodies, Analysis, Experimental data, Reliability, Weight, Theory, Model tests, Power, Pressure, Supersonic flow.

The phenomenon of unipolar ionized gas flow through a slender cylindrical channel is investigated analytically and experimentally. The study has in mind applications in high voltage low current power generation in electrogasdynamic (EGD) devices having high reliability and low specific weight. The theory deals with models in which the length of the channel is considerably larger than the diameter. In all previous EGD power generation studies the length was small compared to the width. In such generators the maximum pressure drop per stage is limited by breakdown potential of closely spaced electrodes. Multistaging leads to complexities because of higher viscous losses. The slender channel analysis presented shows that the electrode spacing and breakdown fields are much larger and that the pressure drop per stage is also increased. Initial experiments at supersonic velocities (MACH 2) indicate that stronger EGD interaction with a gas flow can be achieved at higher densities and velocities. The program establishes the feasibility of the slender channel concept and suggests that increased efficiencies can be obtained by producing colloidal rather than molecular ions at supersonic velocities. (Author)

AD-427 977 Div. 25, 28
OTS price $2.60

Department of the Air Force, Washington, D. C.
STUDIES OF AIR FORCE EXECUTIVES. I. DEVELOPMENT OF AN EXPERIMENTAL TASK INVENTORY FOR EXECUTIVES (TIE) OF THE USAF.
30 Sep 62, 29p.
AF RR62 4 Unclassified report

Descriptors: (*Officer (Personnel), Job analysis), Selection, Leadership, Behavior, Performance tests, Decision making, Aptitude tests.

AD-427 994 Div. 25
OTS price $2.60

Cavendish Lab., U. of Cambridge (Gt. Brit.).
A STUDY, BY X-RAY METHODS, OF ELECTRON DISTRIBUTIONS IN METALS AND ALLOYS.
Final technical rept.,
by W. H. Taylor. 31 July 63, 18p.
Grant AF EOAR61 24
AFOSR J1358 Unclassified report

Descriptors: (*Metals, X-ray diffraction analysis), (*Scattering, Electrons), Alloys, Single crystals, Chromium, Cobalt, Nickel, Aluminum, Measurement, Titanium, Vanadium, Iron, Molybdenum, Rhenium, Technetium, Distribution.

Absolute measurements have been made of X-ray scattering from Cr, CoAl and NiAl. To a first approximation the scattering corresponds to that from ground-state free atoms; the small differences observed are discussed, particularly in relation to other published measurements. The powder techniques used for the above measurements are to be supplemented by the use of single-crystal methods. The necessary preliminary experiments are in progress. The examination of alloy systems and the analysis of the structures of alloy phases have been continued. These include the Al-Fe, Al-Mo, Al-Re, Al-Tc and Co-Mo systems. Interesting generalisations about the nature of the interatomic bonds, and new information about the phase diagrams, have emerged from these studies. (Author)

AD-428 018 Div. 25
OTS price $2.60

United Aircraft Corp., East Hartford, Conn.
ULTRASONIC LIGHT SCANNING AND ACTIVE OPTICAL IMAGING SYSTEM.
Quarterly status rept. no. 2, 19 Sep-19 Dec 63,
by H. G. Aas, R. K. Erf, I. R. Abel and R. Walker. 17 Jan 64, 27p. Rept. C930080 6
Contract NOw63 0657d
Unclassified report

Descriptors: (*Light, Scanning), (*Ultrasonic radiation, Light), (*Images, Scanning), (*Optical scanning, Light), Optical images, Optical equipment, Analysis, Transducers, Configuration, Electrical impedance, Acoustic impedance, Power amplifier, Quartz, Crystals.

A description is presented of the progress made on the research and development of an ultrasonic light scanning and active optical imaging system during the second quarterly reporting period ending 19 December 1963. As in the first quarterly report, the main body of the current report is presented in two sections: Ultrasonic Light Scanning and Active Optical Imaging System. Efforts on the ultrasonic light scanning portion of the work have been concentrated on the analytical evaluation and experimental development of a liquid deflection cell since it is this type of cell which is presently thought to be best suited for the demonstrational model of an optical imaging system. In the second section both analytical and experimental results (the former concerned with the overall system and the latter with the demonstrational model) of the continuing study of the active optical imaging system are presented. (Author)

AD-428 026 Div. 25
OTS price $2.60

Battelle Memorial Inst., Geneva (Switzerland).
AN INVESTIGATION OF THE EFFECTS OF SOLUTE ELEMENTS ON THE MAGNETOELASTIC DAMPING AND COERCIVITY IN VERY PURE IRON.
Summary rept.,
by R. E. Maringer. 15 Jan 64, 22p.
Contract Nonr2600 00, Proj. NR031 629
Unclassified report

Descriptors: (*Iron, Damping), (*Damping, Iron), (*Magnetism, Elasticity), (*Elasticity, Magnetism), Solubility, Magnetic properties, Ferromagnetism, Ferromagnetic materials, Atoms, Time, Hysteresis, Temperature, Viscoelasticity, Theory.

Ferromagnetic domain walls tend to move in phase with an alternating stress or magnetic field. This movement is opposed by the presence of directionally ordered interstitial atoms. When the time associated with the relaxation process is of the order of the period of the moving

walls, a phase lag between the applied field and the domain-wall movement occurs. This phase lag, coupled with normal hysteresis losses, causes the appearance of a variety of magnetic and magnetoelastic phenomena. Among these are a strong temperature dependence of the a-c magnetic permeability and a broad internal-friction peak in the temperature range of the Snoek peaks. These phoenomena can be interpreted in terms of viscoelastic theory, with a relaxation process (interstitial directional ordering) having a unique activation energy. (Author)

AD-428 076 Div. 25
OTS price $12.00

Midwest Research Inst., Kansas City, Mo.
SURVEY OF RADIO FREQUENCY RADIATION HAZARDS.
Final rept., 20 May 61-30 June 62,
by E. J. Martin, Jr., P. C. Constant, Jr., B. L. Jones, E. T. Fago, Jr. and E. G. Cartwright, Jr. 30 June 62, 161p.
Contract NObs77142, MRI Proj. 2307E
Unclassified report

Descriptors: (*Radiofrequency, Radiation hazards), Instrumentation, Power, Density, Theory, Experimental data, Measurement, Calibration, Antennas, Coupling circuits, Attenuators, Thermistors, L band, S band, C band.

AD-428 088 Div. 25, 15
OTS price $1.10

RAND Corp., Santa Monica, Calif.
STATISTICAL PROPERTIES OF THE BLACK BODY RADIATION FIELD,
by Dennis Holliday. Dec 63, 9p. P2884
Unclassified report

Descriptors: (*Blackbody radiation, Quantum statistics), Statistical processes, Quantum mechanics.

AD-428 111 Div. 25
OTS price $9.60

Institute of Optics, U. of Rochester, N. Y.
INTRINSIC PHOTOCONDUCTIVITY IN THE ALKALI HALIDES.
by George R. Huggett. Jul 63, 108p. TN3
Grant DA ARO D31 124 679, OOR Proj. 2045P
AROD 2045 8 Unclassified report

Doctoral thesis.

Descriptors: (*Photoconductivity, Measurement), (*Halides, Alkali metals), Temperature, Potassium compounds, Rubidium compounds, Iodides, Bromides, Chlorides, Photons, Ultraviolet radiation, Photomultipliers, Emissivity, Optical properties, Absorption spectrum, Semiconducting films.

Photoconductivity in thin films of RbI, KBr, KCl and RbCl was measured at temperatures of 10 K and 80 K. Photocurrents were stimulated by irradiating the sample in the fundamental absorption region with ultraviolet light. Saturation curves showing the dependence of photocurrent on the applied voltage were also obtained. (Author)

AD-428.182 Div. 25
OTS price $5.60

Ohio State U. Research Foundation, Columbus.
THE 2-PI TO 2-SIGMA EMISSION BANDS OF CN,
by Hasel James Slone, Jr. Oct 63, 45p. Rept. no. SR1
Contract AF19 604 6150, Proj. 7670, Task 767002
AFCRL 63 781 Unclassified report

Master's thesis.

Descriptors: (*Cyanides, Emissivity), Spectrum analyzers, Infrared spectroscopy, Oxygen, Line spectrum, Intensity, Diffraction gratings, Nuclear spins, Calibration, Tables, Flames.

The 2-pi to 2-sigma (0,0) emission band of CN was observed in the region of 8360 to 8900 reciprocal centimeters using a high resolution prism-grating infrared spectrometer. The 2-pi to 2-sigma (0,1) and (1,2) bands of the same molecule were observed in the region from 6525 to 7160. The source was a fuel-rich oxyacetylene flame. However, instead of using pure oxygen as the oxidant N20 was used with only enough oxygen added to keep the flam from blowing out. An analysis of the bands has been made and values are given for the molecular constants of the molecule. (Author)

AD-428 194 Div. 25
OTS price $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 7, 15 Sep-15 Dec 63. 31 Dec 63, 1v.
Contract AF33 657 8311
Unclassified report

Descriptors: (*Magnetohydrodynamics, Scientific research), Design, Machines, Control panels, Metallography, Tantalum, Tests, Degradation, Impurities, Ceramic coatings, Generators, Heat transfer, Temperature, Power supplies, Argon, Helium.

The experience gained from the first test with the Closed Loop MHD Research Unit on October 11, 1963 is the basis for design modifications, which will be made before the next test of the complete machine. Features of the control panel layout and function are discussed, and additional calculations predicting loop performance are presented. A metallographic examination of an expendable portion of the tantalum structure was made after the full-scale test. The material shows no evidence of deterioration which can be attributed entirely to the dissolution of impurities from the working fluid. The design of the closed loop modified with ceramic-lined end returns is presented as a replacement for the existing structure when the tantalum ultimately fails. (Author)

AD-428 203 Div. 25, 6
OTS price $9.60

Philco Corp., Blue Bell, Pa.
COHERENT OPTICAL BEAM STEERING TECHNIQUES.
Final rept. 27 Dec 62-15 Sep 63,
by Leo W. Procopio, Frederic A. Jessen, Peter M. Nave, and Lewis J. Brown. Jan 64, 103p.
Contract AF30 602 290, Proj. 4506, Task 450608
RADC TDR63 450, vol. 1 Unclassified report

Descriptors: (*Lasers, Optical scanning), (*Optical equipment, Design), Optical equipment components, Sensitivity, Performance (Engineering), Oscillators, Amplifiers, Propagation, X-band, Prisms (Optics), Gases, Semiconductors, Solid state physics, Refractive index.

The technical problems involved in achieving an electronically scanned coherent optical phased array are examined in detail. Background information pertinent to an array design, including studies of coherent optical components, optical losses, limitations imposed by propagation effects, and radiation patterns generated by laser elements is presented. Techniques to achieve both electronic steering of a single laser beam and a phased array of lasers are analyzed. Studies include consideration of the physical

devices themselves, and analysis of their environmental sensitivity, radiation characteristics, and response speeds. Design investigation of the optical phased array includes analysis of the laser oscillator-amplifier combination, the electronically controlled optical phase shifters, the element beam steering devices, and the output telescope systems. Typical design data and performance specifications are presented. Finally, recommendations for further theoretical and experimental research are made. (Author)

AD-428 205 Div. 25
OTS price $1.60

Army Materials Research Agency, Watertown, Mass.
TENSILE SHEET WITH SYMMETRIC EDGE CRACKS WITH LATERALLY CONSTRAINED ENDS,
by Oscar L. Bowie. Dec 63, 13p.
DA Proj. 1A0105018010
AMRA TR63 26 Unclassified report

Report on Basic Research in Physical Sciences.

Descriptors: (*Sheets, Tensile properties), (*Stresses, Numerical analysis), Boundary value problems, Elasticity, Functions, Conformal mapping, Fracture (Mechanics).

Conformal mapping techniques are applied to the mixed boundary problem of tensile sheet (with symmetric edge cracks) with laterally constrained ends. For applications to short test specimens in fracture mechanics, the stress intensity factors for the crack roots are evaluated for varying crack lengths for square sheet. (Author)

AD-428 220 Div. 25
OTS price $2.60

Carlyle Barton Lab., Johns Hopkins U., Baltimore, Md.
VIBRATIONAL AND ROTATIONAL ENERGY LEVELS.
Final rept., Apr 59-Aug 63,
by J. J. Whalen, Robert J. Armstrong and John B. Newman. 30 Sep 63, 17p. Rept. no. WR AF5
Contract AF33 616 6457, Proj. 4150, Task 415001
RTD TDR63 4110 Unclassified report

Descriptors: (*Atomic energy levels, Vibration), (*Molecular rotation, Crystal lattices), Solid state physics, Gases, Uranium, Oxygen, Uranyl radicals, Transition elements, Molecules, Symmetry (Crystallography), Millimeter waves, Absorption.

Two molecular systems each having behavior which undergoes only slight changes in certain solid state environments were studied. The first, a polar molecule in an inert gas crystal, is of interest because the constraints on the molecular rotation, including electronic correlation effects, are expected to be small. The second, the uranyl complex in an ionic solid, was studied because of the interactions between the lattice vibrations and the persistent uranyl vibrations. The results of these studies, which are continuing, are given. (Author)

AD-428 254 Div. 25
OTS price $3.60

Texas A and M Coll., College Station.
A MEASUREMENT OF THE TEMPERATURE DEPENDENCE OF THE ABSORPTION EDGE OF SINGLE CRYSTALS, USING POLARIZED LIGHT,
by Robert Latham Dunham. Jan 64, 27p.
Unclassified report

Master's thesis.

Descriptors: (*Single crystals, Polarization), (*Polarization, Single crystals), (*Light, Polarization), (*Temperature, Measurement), Absorption, Iodine, Electronics, Noise (Radio), Photomultipliers), Spectroscopy, Cadmium compounds, Sulfides, Infrared spectroscopy.

The attempt to measure the absorption edges of single crystals of iodine as a function of temperature, using polarized light, was primarily unsuccessful. Electronic noise which could not be eliminated prevented the recording of any useful information. The substitution of a photomultiplier which had a spectral response in the visible spectrum for the one with spectral response in the infrared made possible the measurement of the absorption edge of single crystals of cadmium sulfide. The cadmium sulfide measurements were in close agreement with published data. (Author)

AD-428 260 Div. 25
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
EFFECT OF CONSTANT LONGITUDINAL ACCELERATION ON THE TRANSVERSE VIBRATION OF UNIFORM BEAMS,
by Paul Seide. 21 Oct 63, 26p. Rept. no. TDR169 3560 30 TN6
Contract AF04 695 169
Unclassified report

Descriptors: (*Beams (Structural), Vibration), (*Loading (Mechanics), Analysis), Acceleration, Deflection, Motion, Equations, Numerical analysis.

The effect of longitudinal inertia forces on the natural transverse vibration frequencies of a beam given a constant acceleration by a force applied at one end is investigated. The variation of the frequency spectrum with end load is presented in both tabular and graphical form. The variation of modal patterns with end load is also shown. (Author)

AD-428 264 Div. 25
OTS price $8.10

Michigan U. Coll. of Literature, Science and the Arts, Ann Arbor.
THE PLASMA TEST PARTICLE PROBLEM,
by C. W. Hirt. Sep 63, 1v.
Contract Nonr1224 15, NSF Grant GP1536, ORA Proj. 03114; 05963
Unclassified report

Descriptors: (*Plasma medium, Particles), (*Particles, Plasma medium), Kinetic theory, Plasma physics, Drag, Hydrodynamics, Linear systems, Equations, Dielectric properties, Electrons, Momentum, Correlation techniques, Functions, Integrals.

A charged test particle passing through an electron plasma is subject to a drag force. The calculation of the drag, when the test particle's velocity is maintained at a constant value, is referred to as the plasma test particle problem. Several calculations of the drag have been given, but all treatments have resulted in a logarithmically diverging drag expression. The purpose of this dissertation is to give a convergent and consistent treatment of the plasma test particle problem. (Author)

AD-428 299 Div. 26, 17
OTS price $6.60

Army Frankford Arsenal, Philadelphia, Pa.
JOINING OF STEEL AND OTHER WEAR-RESISTANT METALS

TO ALUMINUM ALLOYS,
by M. S. Orysh, I. G. Betz and F. W. Hussey.
Aug 63, 57p.
Proj. 5350 60 268
AFA M64 8 1 Unclassified report

Descriptors: (*Aluminum alloys, Thermal joining), (*Steel, Thermal joining), Arc welding, Diffusion, Bonding, Metal coatings, Silver solders, Zinc coatings, Aluminum alloys, Metal plates, Sheets, Pipes, Tensile properties, Shear stresses, Metal joints, Brazing, Stainless steel, Reviews, Tests.

The joining of steel and other wear-resistant metals to aluminum alloys was investigated by reviewing the literature, investigating arc welding and diffusion bonding, and evaluating pertinent commercial products. The steel members used in the arc welding and diffusion bonding, and evaluating pertinent commercial products. The steel members used in the arc welding and diffusion investigation had a coating of a silver brazing alloy, zinc, or aluminum. The samples of commercial products consisted of aluminum brazed to steel by proprietary processes and aluminum bonded to steel in sheet, plate, and tube form. Plates of 2024 aluminum alloy overlaid with two metallized coatings and three experimental hard-surfacing aluminum alloys were also evaluated. (Author)

AD-428 303 Div. 25, 9
OTS price $9.10

Michigan U., Ann Arbor.
DIGITAL COMPUTER ANALYSIS OF CONDENSATION IN HIGHLY EXPANDED FLOWS,
by James L. Griffin. Nov 63, 97p.
Contract AF33 657 8867, Proj. 7116, Task 7116 01
ARL 63 206 Unclassified report

Report on Energy Conversion Research.

Descriptors: (*Condensation, Gas flow), (*Hypersonic flow, Condensation), (*Phase studies, Condensation), Hypersonic wind tunnels, Nitrogen, Vapors, Metals, Vaporization, Surface tension, Specific heat, Hypersonic nozzles, Kinetic theory, Programming (Computers), Copper, Zinc, Drops, Mathematical prediction, Equations of state, Nucleation, Thermodynamics, Energy conversion.

The application of the IBM 7090 digital computer to the theoretical prediction of condensation in highly expanded flows is presented. The equations of the spontaneous nucleation theory of Frenkel are combined with the steady one-dimensional diabatic flow equations for a solution of the expansion of a pure vapor. A digital computer program for the solution of these equations is compiled and presented. The theoretical prediction of the condensation of nitrogen is compared to experimental results and variations in specific heat, latent heat of vaporization, surface tension, and rate of expansion. The theoretical calculation is applied to metal vapors and the results for copper and zinc vapors are presented. The results indicate that the theoretical solution gives a reasonable prediction of the condensation in highly expanded flows. The degree of supersaturation increases with an increased rate of expansion and for a proper set of initial conditions, condensation-free flow is obtainable. The rate of expansion and the surface tension are the most critical parameters in the equations for condensing flow. Variations of specific heat and latent heat of vaporization show only minor effects on the end result. (Author)

AD-428 309 Div. 25
OTS price $1.10

Army Materials Research Agency, Watertown, Mass.
ON THE SIGN OF THE EXCHANGE INTEGRAL IN TRANSITION METALS,
by R. J. Weiss. Dec 63, 8p.
Proj. 1A010501B010
AMRA TR63 29; R141 Unclassified report

Descriptors: (*Metals, Transition elements), (*Ferromagnetism, Antiferromagnetism), Integrals, Alloys, Crystal structure, Chromium, Manganese, Iron, Cobalt, Nickel, Praseodymium, Nuclear spins, Neutron diffraction analysis.

A qualitative picture of the electronic structure of ferromagnetic and antiferromagnetic metals and alloys is given. Ferromagnetism occurs when half the 3d states are completely filled while antiferromagnetism occurs when neither half the 3d states is completely filled. Gamma iron appears to be an example of a metal that can exist in both forms. (Author)

AD-428 310 Div. 25
OTS price $15.50

McDonnell Aircraft Corp., St. Louis, Mo.
ANALYSIS OF PLASMA GENERATORS.
Final rept., May-Dec 63,
by Donald R. Hesser. 16 Jan 64, 215p. Rept. no. A220
Contract AF33 657 11464, Proj. 4107, Task 410721
RTD TDR63 4222 Unclassified report

Report on Telemetry and Command Destruct Techniques.

Descriptors: (*Plasma medium, Generators), (*Generators, Plasma medium), Plasma physics, Analysis, Experimental data, Tests, Telemeter systems, Reentry vehicles, Electromagnetic waves, Propagation, Antennas, Shock tubes, Wind tunnels, Ranges (Establishments).

This report is an evaluation of existing plasma generators in terms of their capability of providing experimental data, useful to the determination of telemetry plasma sheath interactions, and the formulation of techniques for testing telemetry under simulated re-entry conditions. The plasma characteristics of typical re-entry plasmas were calculated to delineate the range of parameters to be simulated. Electromagnetic wave propagation and antenna effects were reviewed to establish the parameters to be studied in the experimental tests. The plasma generators studied were: radio frequency plasma generators, low density plasma generators, glow discharge tubes, shock tubes, electromagnetic shock tubes, hypervelocity impulse tunnels, shock tunnels, arc heated wind tunnels, and free flight ranges. These were categorized according to electron concentration, collision frequency, operating pressure, cost, geometric size, test time, and frequency of operation. Tests were formulated to evaluate reflection, and attenuation effects, information rate, modulation parameters, antenna breakdown, and also complete systems. (Author)

AD-428 313 Div. 25
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF ADDITIONAL STRAINS IN PROBLEMS OF

PLASTICITY THEORY,
by I. A. Birger. 22 Aug 63, 19p.
FTD TT63 642 Unclassified report

Trans. from Izvestiya AN SSSR, Otdeleniye Tekhnicheskikh, Mekhanika i Mashinostroyeniye, no. 1, pp. 47-56, 1963.

Descriptors: (*Plasticity, Theory), (*Strain (Mechanics), Deformation), Stresses, Cylindrical bodies, Inequalities, Integral equations, Functions, Numerical analysis.

AD-428 315 Div. 25
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MOBILITY OF ELECTRONS IN HIGHLY ALLOYED SILICON,
by E. M. Omel'yanovskiy, V. I. Fistul' and M. G. Mil'vidskiy. 23 Aug 63, 10p.
FTD TT63 687 Unclassified report

Trans. from Fizika Tverdogo Tela, 5:3, pp. 921-927, 1963.

Descriptors: (*Electrons, Motion), (*Silicon alloys, Single crystals), Arsenic, Phosphorus, Temperature, Hall effect, Impurities, Antimony, Diffusion.

AD-428 331 Div. 25, 16
OTS price $11.00

Army Aeromedical Research Unit, Fort Rucker, Ala.
A SURVEY OF INTERNAL AND EXTERNAL NOISE ENVIRONMENTS IN US ARMY AIRCRAFT,
by Donald C. Gasaway and Jimmy L. Hatfield.
Dec 63, 140p.
AARU 64 1 Unclassified report

Descriptors: (*Army aircraft, Noise), (*Noise, Army aircraft), Noise generators, Rotary wings, Analysis, Environmental tests.

Representative internal and external noise environments are described for each major type of Army aircraft during normal operations. Measurements for all fixed- and rotary-wing aircraft are classified, when appropriate, into four major categories: ground operations, hovering flight, normal, and maximum cruise conditions. The contributions of major noise generators in each type of aircraft is discussed in detail. (Author)

AD-428 334 Div. 25, 17
OTS price $1.60

Northwestern U., Evanston, Ill.
THE EFFECT OF SOLUTE-IMPERFECTION INTERACTIONS UPON PLASTICITY AND FRACTURE.
Final rept., 1 Nov 60-31 Oct 63,
by J. O. Brittain. 31 Oct 63, 12p.
Contract AF49 638 780
AFOSR J1353 Unclassified report

Descriptors: (*Solutions, Plasticity), (*Materials, Fracture (Mechanics)), Mechanical properties, Aluminum compounds, Oxides, Iron, Particles, Velocity, Steel, Nitrogen, Nitrides, Nickel alloys, Aluminum alloys, High temperature research.

This report is concerned with an investigation of the effect of solute-imperfection interactions upon plasticity and fracture. Insofar as the yielding of materials that deform in a heterogeneous manner are concerned, we have demonstrated that the addition of a hard noncoherent particle such as aluminum oxide to alpha-iron results in a modification of the yielding, flow, and strain aging of the alpha-iron. The hard particles appear to act as dislocation sources and to effect the velocity of dislocations in the alpha-iron matrix. From these results, it is suggested that the aluminum additions made in the production of ''killed'' steel has two roles: (1) the well known chemical effect of decreasing the nitrogen content by the formation of a nitride and (2) from our work a physical effect probably due to the trapping of interstitial elements at dislocations associated with the inclusions formed in the deoxidation and denitriding practice. An experimental investigation of the influence of departure from stoichiometry upon plasticity in NiAl revealed that the compressive yield stresses were in general higher for the substitutional defects (high Ni composition) than for the vacancies (low Ni compositions). (Author)

AD-428 335 Div. 25, 8
OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF ZINC BLENDE TYPE SEMICONDUCTORS,
by A. C. Beer. 25 Oct 63, 19p.
Contract AF49 638 959
AFOSR J1352 Unclassified report

Descriptors: (*Semiconductors, Indium alloys), (*Gallium alloys, Semiconductors), Antimony alloys, Crystal growth, Crystal lattice defects, Impurities, Phase studies, Electron transistors, Nuclear spins, Cyclotron resonance phenomena, Magnetic fields, Diodes (Semiconductors), Solid state physics, Thermal expansion, High temperature research, Relaxation time, Lithium, Diffusion.

The accomplishments are presented under three broad categories, namely: I. Research concerned with InSb, which involves transport effects, high pressure phase transitions, and studies of the kinetics of crystal growth and related phenomena; II. Studies of impurity behavior in GaSb, which have shed light on the nature of the residual acceptors present in material prepared under conditions conducive to achievement of highest purity; and III. Transport studies in GaSb, which have revealed the importance of impurity states associated with subsidiary conduction band minima. Implications of the findings in these areas are discussed, and suggestions for further work are given in certain instances. (Author)

AD-428 349 Div. 25
OTS price $1.10

Pittsburgh U., Pa.
MAGNETIC AND STRUCTURE PROPERTIES OF SOLIDS AND SOLUTIONS.
Final rept. pt. 2,
by F. Keffer, J. H. Anderson and T. Holstein. 1963, 3p.
Contract AF49 638 323
AFOSR 4318 pt. 2 Unclassified report

Descriptors: (*Solids, Magnetic properties), (*Solutions, Magnetic properties), Structural properties, Magnetic fields, Thermodynamics, Ferromagnetism, Hall effect, Magnetism, Resistance (Electrical), Low temperature research, Titanium, Quartz, Anisotropy, Crystal.

AD-428 394 Div. 25
OTS price $1.10

Stockholm U. (Sweden).
THEORETICAL INVESTIGATIONS OF THE ELECTRONIC

STRUCTURES AND STATES OF MOLECULES AND CRYSTALS.
Quarterly technical status rept. no. 3, 1 Sep-30 Nov 62,
by Inga Fischer-Hjalmars and Stig Flodmark.
30 Nov 62, 3p.
Contract DA91 591EUC2270
Unclassified report

Descriptors: (*Crystal structure, Atomic orbitals), Atomic energy levels, Electron density, Quantum mechanics, Programming (Computers), Research program administration, Oxygen, Symmetry (Crystallography).

AD-428 401 Div. 25, 4
OTS price $1.60

California U., Los Angeles.
EMISSION AND DISSOCIATION OF NO SUB 2 IN SHOCK WAVES.
Final technical rept.,
by E. R. Hardwick. 18 Sep 63, 11p.
Grant AF AFOSR62 240
AFOSR J1361 Unclassified report

Descriptors: (*Reaction kinetics, Shock waves), (*Chemical reactions, Spectroscopy), Nitrogen compounds, Dioxides, Time, Dissociation, Argon, High-temperature research, Absorption spectrum, Pyrolysis, Emissivity, Infrared spectroscopy, Mass spectroscopy, High-pressure research.

When compared with other kinetic data, the time dependence of the emission of NO2 in shock waves in the vicinity of 2000 K supports the conclusion that the intensity follows (NO2) in this system. Study of the emission from the system of CH3NO2-Ar shows that NO2 appears following the shock, but that it has a very short lifetime, presumably reacting according to CH3+NO2 yields CH3O+NO. (Author)

AD-428 416 Div. 25, 4
OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
INVESTIGATION OF SYSTEMS IN THE LIQUID CRYSTAL STATE. III. CHOLESTERYL CAPRYLATE AND CHOLESTERYL CAPRATE,
by I. G. Chistyakov, V. A. Usol'tseva, M. D. Nasyrova and L. I. Yershoba. 1963, 4p.
AERDL T1707 Unclassified report

Descriptors: (*Cholesteryl esters, Crystals), Analysis, Liquids, Supercooling, Phase studies, Instrumentation, Polarization, Microscopes, Cameras, Pyrometers.

AD-428 419 Div. 25
OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
ELECTRON-OPTICAL INVESTIGATIONS OF MULTI-LAYER PHOTOCATHODES,
by L. N. Vykhovskaya and Yu. M. Kushnir.
AERDL T1710 Unclassified report

Trans. from Zhurnal tekhnicheskoy fiziki, 25:14 pp. 2477-2485, 55.

Descriptors: (*Electron optics, Photocathodes), (*Electron microscopy, Emissivity), (*Cathodes (Electron tubes), Design), Infrared radiation, Electron microscopes, Antimony, Cesium electron tubes, Bismuth, Oxygen, Cesium.

The object of this study was to design and build a sealed glass emission microscope with a resolution of the order of 2 microns and to carry out systematic investigations of the distribution of integral and spectral sensitivity over the surface of photocathodes of different types. (Author)

AD-428 424 Div. 25, 26
OTS price $7.60

Ion Physics Corp., Burlington, Mass.
P-N JUNCTION FORMATION TECHNIQUES.
Quarterly technical progress rept. no. 1,
2 Oct 63-2 Jan 64.
2 Jan 64, 66p.
Contract AF33 615 1097
Unclassified report

Descriptors: (*Solar cells, Silicon), (*Semiconducting films, Vapor plating), Single crystals, Vacuum apparatus, Plasma medium, Tantalum, Glass, Phosphorus, Ions, Resistance (Electrical), Production, Manufacturing methods, Tracer studies.

An applied research program has been initiated to increase the state-of-the-art efficiency of solar cells produced by ion implantation techniques and to demonstrate feasibility for producing thin film solar cells by plasma deposition. During this quarter, efforts in the ion implantation area primarily have involved foundation investigations and equipment modifications. Previous investigations had pointed out three major problem areas in ion implantation cells; material problems, resistivity problems, and other problems resulting from implantation techniques. The latter, in particular, involved forward leakage effects which were masking the effects on cell performance of other variables such as junction profile variations. A major effort was made to determine the reasons for this leakage and results unequivocably indicate the source to be pipes caused by dirt-shadowing during implantation. An extensive investigation was initiated into an exact measurement of the actual junction profiles present as a function of implantation parameters and annealing procedures. This involves a determination of the ratio of electrically active to physically present phosphorous by resistivity and tracer techniques. (Author)

AD-428 434 Div. 25
OTS price $14.00

General Atomic Div., General Dynamics Corp., San Diego, Calif.
RECOMBINATION AND ATTACHMENT IN IONIZED GASES,
by V. A. J. van Lint, J. Parez, M. E. Wyatt and D. K. Nichols. Dec 63, 196p.
Contract AF29 601 2779, Proj. 7811, Task 781101
RTD TDR63 3076 Unclassified report

Descriptors: (*Gas ionization, Recombination reactions), (*Microwaves, X-band), Gases, Attenuation, Propagation, Cavity resonators, Oxygen, Nitrogen, Helium, Neon, Argon, Programming (Computers), Plasma medium, Diffusion.

Experiments were performed to measure the coefficients for electron attachment, electron-ion recombination, electron-molecule collisions, and ion-ion recombination in important atmospheric gases and atmospheric impurities. These experiments were performed by observing the rate of disappearance of electrons (or ions) in the afterglow of a pulse of ionization produced by high energy electrons transversing the gas sample. Most of the diagnostic measurements were performed by observing the phase shift and attenuation of an X-band microwave propagated through the ionized gas. Some experiments were performed with a 300 Mc resonating cavity which is sensitive enough to detect the effect of ions in the afterglow after the electrons have been attached. (Author)

AD-428 442 Div. 25, 15
OTS price $3.60

Army Materials Research Agency, Watertown, Mass.
MEMBRANE NATURAL FREQUENCIES FOR AXISYMMETRIC VIBRATION OF DEEP SPHERICAL CAPS,
by Edward W. Ross, Jr. Dec 63, 34p.
AMRA TR63 23 Unclassified report

Descriptors: (*Elastic shells, Vibration), (*Frequency, Equations), Bessel functions, Taylor's series, Numerical analysis, Spheres, Polynomials.

This paper contains the results of an analysis of the natural frequencies for the axially symmetric vibration of a thin shell in the form of a segment of a sphere with a free edge. In the present analysis only the membrane theory is used, i.e., bending effects are neglected. The effects of both the longitudinal, i.e., in-surface and transverse perpendicular-to-the-surface inertias are retained, and the entire range of opening angles is considered. The main body of the results is obtained by numerical solution of the frequency equation although a number of limiting cases are treated analytically. (Author)

AD-428 452 Div. 25, 17
OTS price $7.60

Boeing Scientific Research Labs., Seattle, Wash.
THE ANALYSIS OF FRACTURE SURFACES BY ELECTRON MICROSCOPY,
by Regis M. N. Pelloux. Rev. Dec 63, 75p.
Document no. D1 82 01 69R1
Unclassified report

Also available from the author.

Descriptors: (*Fractography, Electron microscopy), (*Fracture (Mechanics), Surfaces), Analysis, Microstructure, Plasticity, Brittleness, Grain structures (Metallurgy), Deformation, Alloys, Metals, Fatigue (Mechanics), Corrosion, Stresses, Ductility, Grain boundaries, Simulation, Films.

This paper reviews and illustrates the characteristic features of the following modes of fracture: (1) Transgranular fracture which can take place either - by cleavage along crystallographic planes - or by the formation and coalescence of microvoids which leave concave depressions called ''dimples'' on both fracture surfaces, - or by the slow progression of a fatigue crack by a mixed ductile - cleavage mode of fracture. (2) Intergranular fracture which is either - brittle when there is a perfect separation of the grains along the grain boundaries, - or ductile when this separation is associated with the plastic formation of void along the grain boundaries. (Author)

AD-428 536 Div. 25, 4
OTS price $1.10

Institute of Science and Tech., U. of Michigan, Ann Arbor.
LUMINESCENCE OF MANGANESE-ACTIVATED MAGNESIUM GERMANATE,
by Richard A. Phillips. Jan 64, 8p. Rept. no. 2900 446R
Contract DA36 039sc78801
Unclassified report

Descriptors: (*Magnesium compounds, Germanium compounds), (*Germanuim compounds, Magnesium compounds), (*Manganese, Luminescence), (*Luminescence, Manganese), Emissivity, Spectroscopy, Oxygen compounds, Temperature, Narrowband, X-ray diffraction analysis, Powders, Valence, Phosphorescent materials.

The emission spectrum of Mg4GeO6:0.01 Mn has been found to depend on the temperature of preparation. The spectrum of the sample prepared at 1275C shows four narrow bands at 6200 Angstroms to 6600 Angstroms; the spectrum of the sample prepared at 1475 C consists of a broad band centered at 6150 Angstroms. X-ray diffraction patterns of the powders indicate the presence of an intermediate phase in the sample prepared at 127 C. It was concluded that the valence of the manganese activator is different in the two samples. (Author)

AD-428 543 Div. 25, 2
OTS price $2.60

Naval Research Lab., Washington, D. C.
THE INTERPRETATION OF INFRARED RADIATION FROM THE SEA IN TERMS OF ITS BOUNDARY LAYER,
by M. F. M. Osborne. 16 Sep 63, 20p.
NRL 5977 Unclassified report

Descriptors: (*Infrared radiation, Sea water), (*Oceans, Surfaces), (*Boundary layer, Numerical analysis), Temperature, Radiometers, Measurement, Ocean models, Turbulence.

By writing down the heat balance due to radiation, conduction, and evaporation at the sea surface, one can express the radiation temperature of the sea surface as a linear function with known coefficients of two variables: the water boundary layer thickness and the ratio of water to air boundary layer thickness. Under the assumption that these two variables can be described by laminar flow for short distance (less than 10 cm) and small intervals (less than 1 sec), one can derive the conditions for optimum observation of detailed structure in the sea surface temperature. These are clear sky, dry air, and especially an appreciable wind. Calculations were made of the small changes in the radiation temperature of the sea produced by mean air velocity changes of 1 cm/sec and mean water velocity changes of 1 mm/sec. Predictions were made concerning the temperature patterns to be observed around known velocity patterns in the air and water. The signs of temperature fluctuations around some patterns may be reversed depending upon whether radiation or evaporation is dominant. Much experimentation is necessary to check and enlarge the conclusions. For example, slicks would generally be expected to be cold patches, even though they may have properties which raise the surface temperature, and studies of slicks would be a good test of the theory. (Author)

AD-428 544 Div. 25
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF OPTICAL OSCILLATOR ON RUBY AT LIQUID NITROGEN TEMPERAUTRE,
by V. K. Konyukhov, L. A. Kulevskiy and A. M. Prokhorov. 21 Oct 63, 5p.
FTD MT63 100 Unclassified report

Trans. from Doklady AN SSSR, 149:3, pp. 571-572, 1963.

Descriptors: (*Lasers, Ruby), Temperature, Oscillators, Interferometers, Photomultipliers, Liquefied gases, Nitrogen, Paramagnetic resonance.

AD-428 555 Div. 25
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TURBULENT THEORY OF A WEAKLY NONEQUILIBRIUM

RAREFIED PLASMA AND THE STRUCTURE OF SHOCK WAVES, by A. A. Galeyev and V. I. Karpman. 7 Oct 63, 21p.
FTD MT63 96 Unclassified report

Trans. from Russian periodical, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 44:2, pp. 592-602, 1963.

Descriptors: (*Plasma medium, Turbulence), (*Shock waves, Kinetic theory), Theory, Magnetohydrodynamics, Equations, Motion, Oscillations, Magnetic fields, Perturbation theory.

A kinetic equation is derived for interacting waves in a weakly nonequilibrium rarefied plasma. The relation between the laminar and turbulent theories of shock waves without collisions in a strong magnetic field is discussed. An estimate of the turbulent width of shock waves is made on the basis of the kinetic equation. (Author)

AD-428 556 Div. 25
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL INVESTIGATIONS OF THE HEAT EXCHANGE OF HEATED BODIES IN A FLOW OF GAS DURING NON-EQUILIBRIUM EXOTHERMAL CHEMICAL REACTIONS,
by Yu. N. Petrov, S. F. Evlanov and N. M. Bolbit. 28 Oct 63, 13p.
FTD MT63 95 Unclassified report

Trans. from energeticheskiy Institut, AN SSSR, Fizicheskaya Gazodinamika Teploobmen I Termodinamika Gazov Vysokikh Temperatur, pp. 188-193, 1962.

Descriptors: (*Gas flow, Heat transfer), Thermodynamics, Chemical reactions, High-temperature research, Temperature, Measurement, Hydrogen, Air.

AD-428 557 Div. 25
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONCERNING THE SOLUTION OF CERTAIN PROBLEMS OF MAGNETOHYDRODYNAMICS IN THE PRESENCE OF ANISOTROPIC CONDUCTIVITY,
by G. A. Lyubimov. 19 Nov 63, 25p.
FTD MT63 7 Unclassified report

Trans. from Prikladnaya Matematika i Mekhanika, 26:3, pp. 530-541, 1962.

Descriptors: (*Magnetohydrodynamics,, Gas ionization), (*Electrical conductance, Anisotropy), Charged particles, Gas flow, Electromagnetic fields, Electrodes, Dielectrics.

From the generalized Ohm's law with certain assumptions concerning the nature of the problems under consideration we obtain one vector equation describing the change in the magnetic field, an equation not depending on the equations of mechanics. IF we consider the parameters of the problem as not depending on one of the coordinates then this equation reduces to a system of two scalar equations. The properties of certain particular solutions of this system are indicated. For the case of small currents and large external magnetic fields, when in the first approximation it is possible to neglect induced fields, the solution of the system obtained can be sought in terms of total current flowing in the system, and the external field. An example to consider is the problem of the effect of anisotropic conductivity on the flow of gas in a channel in crossed electric and magnetic fields. (Author)

AD-428 564 Div. 25
OTS price $1.10

Army Materials Research Agency, Watertown, Mass.
THE ANOMALOUS DIFFRACTION OF X RAYS,
by R. J. Weiss. Dec 63, 3p.
Proj. 1A010501B010
AMRL TR63 32; MRL143 Unclassified report

Descriptors: (*X-ray diffraction analysis, Theory), (*X-rays, Intensity), Mathematical analysis, Integrals.

A simple solution to the integrated intensities of X rays diffracted in the anomalous region is reported. The solutions are tabulated in most mathematical tables. (Author)

AD-428 583 Div. 25, 14, 12
OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE THERMODYNAMICS OF THE PHENOL-FORMALDEHYDE RESIN: CARBON-HYDROGEN-OXYGEN VAPOR SYSTEM,
by F. J. Krieger. Jan 64, 1v. Memo. RM3988PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Ablation, Phenolic plastics), (*Phenolic plastics, Thermodynamics), (*Heat resistant plastics, Thermodynamics), (*Thermodynamics, Plastics), Gases, Mixtures, Smokes, Solids, Carbon, Hydrogen, Oxygen, Enthalpy, Entropy, Tables, Nomographs, Heat of formation, Reentry vehicles.

The purpose of this study is the thermodynamic investigation of phenol-formaldehyde resin over a range of temperatures up to 6000 K and pressures up to 10 to the 5th power atmospheres. Two sets of equilibrium composition equations are used--one representing a pure gas phase, the other a heterogeneous system of gas and solid carbon. The gas phase of the heterogeneous chemical system, like the homogeneous gas phase, comprises 73 gaseous carbon-hydrogen-oxygen species. The results of the computational program are presented in both tabular and graphic form. The latter is a conventional Mollier diagram in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. (Author)

AD-428 590 Div. 25
OTS price $1.50

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
CHEMICAL FORMATION OF MICROCIRCUIT ELEMENTS.
Rept. for 28 Jan-27 Sep 63,
by T. K. Lakshmanan, C. A. Wysocki and J. M. Mitchell. Dec 63, 52p.
Contract AF30 602 2971, Proj. 5578, Task 557804
RADC TDR63 491 Unclassified report

Descriptors: (*Dielectric films, Dielectric properties), (*Titanium compounds, Oxides), (*Capacitance, Measurement), Temperature, Capacitors, Resistors, Test, Microminiaturization (Electronics), Chemical analysis.

A sputtering technique for the preparation of dielectric films of titanium oxide is described. Uniformity, reproducibility, and stability during the period of test were established. Capacitance values are about 0.4 microfarads/sq. cm. Frequency dependence and temperature coefficient of capacitance and dissipation are given. Curves showing long term stability of resistive films are included. The feasibility of using this technique for developing titanium resistors and capacitors is demonstrated. (Author)

AD-428 606 Div. 25, 6, 8
OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
RESEARCH ON PHYSICAL PHENOMENA AFFECTING THE CHARACTERISTICS OF ELECTRONIC COMPONENTS,
by C. K. Birdsall, S. A. Colgate, A. J. Lichtenberg and A. W. Trivelpiece. 30 Nov 63, 18p.
S601486
Contract AF33 657 7614, Proj. 4150, Task 415001
RTD TDR63 4143 Unclassified report

Descriptors: (*Plasma physics, Theory), Capacitors, Ferrites, Plasma sheath, High-temperature research, Interferometers, X band, Traveling wave tubes.

Theoretical and experimental studies on high-temperature plasmas are described. The high-temperature plasma results are reported in detail first and then the published results of the two year period, covered in detail in technical or memoranda reports, are summarized. The reader who wishes to obtain technical detail in depth greater than that given here should seek out the numerous Technical and Internal Memorandum Reports issued on this contract. Most of the reports refer to electron-beam microwave-tube type projects completed in the early part of the contract and are no longer available for distribution. (Author)

AD-428 610 Div. 25, 30
OTS price $8.10

International Business Machines Corp., Poughkeepsie, N. Y.
USE OF OPTICAL MASERS IN PRINTERS AND DISPLAYS.
Final rept., 7 July-6 Oct 63,
by H. Fleisher and W. Kulcke. 6 Oct 63, 79p.
Rept. no. 3
Contract DA36 039AMC00118E
Unclassified report

Descriptors: (*Lasers, Data processing systems), (*Display systems, Printing), (*Input-output devices, Electron optics), Refraction, Deflection, Refractive index, Single crystals, Polarization, Calcite.

Laser technology is developed for computer input-output devices such as display, fast printing, etc., and to prepare a laboratory-type demonstration to indicate the ability to electronically modulate and deflect a light beam. This task is preparatory to further development of a complete laser display system. (Author)

AD-428 634 Div. 25
OTS price $6.60

RCA Defense Electronic Products, Princeton, N. J
APPLIED RESEARCH PROGRAM ON HIGH TEMPERATURE RADIATION RESISTANT SOLAR CELL ARRAY, VOLUME II.
Technical rept., 15 Apr-15 Oct 63.
Dec 63, 57p.
Contract AF33 657 8490, Proj. 8173, Task 817301 16
ASD TDR63 516, vol. 2 Unclassified report

Descriptors: (*Solar cells, High-temperature research), (*High-temperature research, Radiation damage), (*Radiation damage, Solar cells), Configuration, Aerospace craft, Gallium compounds, Arsenides, Cadmium compounds, Sulfides, Thin films (Storage devices).

This technical report presents the results of the research, testing, and fabrication performed during the period from April 15, 1963, to October 15, 1963. The overall objective of the program is the development of the technology necessary for the production of a high-temperature, radiation-resistant, solar-cell array in a configuration suitable to aerospace vehicles. This project includes (1) determination of the mechanical, thermal, optical, and electrical parameters of gallium arsenide (GaAs) cells, individually and as part of a panel; (2) evaluation of the performance of GaAs cells under the conditions of nuclear radiation encountered in an orbital environment as compared with Silicon (Si) and cadmium (CdS) cells in similar environments; (3) a feasibility study of thin-film GaAs; and (4) a document summarizing the work and containing recommendations for further research and development in this area. Further investigation and fabrication were made of thin-film GaAs cells. Anewly developed surface-barrier type was studied as well as the customary p-n junction units. (Author)

AD-428 635 Div. 25, 17
OTS price $2.75

Research and Technology Div., Air Force Systems Command, Washington, D. C.
TABLES OF INTERPLANAR SPACINGS COMPUTED FOR COPPER Ka, Ka1, Ka2, Kb,
by William L. Baun, H. J. Garrett and R. E. Brocklehurst. Dec 63, 147p.
Proj. 7360, Task 736005
RTD TDR63 4202 Unclassified report

RTD TDR63 4202, revision of WADC TR57 381, dtd Feb 58. Rept. on Materials Analysis and Evaluation Techniques.

Descriptors: (*Tables, Copper), (*Copper, Crystal lattices), (*Crystal lattices, Copper), X-ray diffraction analysis, Crystal lattices.

This report contains values of interplanar spacings, or 'd' values obtained from solutions of the Bragg equation n lambda = 2d sin theta for K alpha, K alpha sub 1, K alpha sub 2, and K beta lines of copper. These tables of values derived from the Bragg equation for copper have been extracted from WADC TR 57-381 which also carried tables of values for molybdenum, iron, chromium and cobalt. (Author)

AD-428 670 Div. 25
OTS price $14.50

Philco Corp., Blue Bell, Pa.
COHERENT OPTICAL BEAM STEERING TECHNIQUES.
Final rept.,
by Leo W. Procopio, Frederic A. Jessen, Peter M. Nave and Lewis J. Brown. Jan 64, 209p.
Contract AF30 602 2901, Proj. 4506, Task 450608
RADC TDR63 450, vol. 2 Unclassified report

Descriptors: (*Light, Signals), Energy, Electrons, Atoms, Photons, Photon bombardment, Electric currents, Frequency, Degradation, Electric fields, Magnetic fields, Solids, Liquids, High-pressure research, Gases.

AD-428 674 Div. 25, 2, 8
OTS price $1.60

Radio Observatory, Calif. Inst. of Tech., Pasadena.
PRELIMINARY MEASUREMENTS ON THE DISTRIBUTION OF LINEAR POLARIZATION OVER EIGHT RADIO SOURCES,
by D. Morris, V. Radhakrishnan and G. A. Seielstad. 1963, 15p.
Contract Nonr22019
Unclassified report

Descriptors: (*Radio waves, Measurement), (*Polarization, Distribution), Radio astronomy, Antennas, Stars, Galaxies.

The feasibility of the determination of polarization distributions over radio sources by var-

iable spacing interference polarimetry was tested. The results of preliminary measurements for eight strong sources are presented. The polarized region in the Crab Nebula at 10.6-cm wavelength is roughly one-half the diameter of the unpolarized source. Both components of the central source in Centaurus A are found to be linearly polarized, but with their planes of polarization at 44 degrees to each other. The observations on five other double sources, 3C 270, Pictor A, Hercules A, 3C 353 and Cygnus A show evidence of two or more polarized regions on each source with different preferred directions. M87, the galaxy with the optically polarized 'jet', seems to have a polarized halo at 21 cm whereas earlier measurements at the same wavelength had indicated that the core was essentially unpolarized. (Author)

AD-428 699 Div. 25, 30, 4
OTS price $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
CHEMICAL REACTIONS USING MODULATED FREE RADICAL BEAMS.
Final rept.,
by W. L. Fite. 22 Oct 63, 29p. Rept. no. GA4682
Contract AF49 638 1191, GA Proj. 308
AFOSR J1362 Unclassified report

Descriptors: (*Particle beams, Hydrogen), (*Kinetic theory, Scientific research), (*Hydrogen, Kinetic theory), (*Deuterium, Kinetic theory), Combustion, Reaction kinetics, Alkali metals, Scattering, Signal-to-noise ratio, Cryogenics.

Although the research was unable to make high quality quantitative measurements on the H + D2- HD + D reaction, the experience gained points important directions for state-of-the-art improvements. Turning to the H + D2 case, it is clear that at least one of the following technical advances must be made to ensure the success of such measurements: (1) a D2 purity higher than 99.5% must be obtained and if the signal-to-noise ratio is to be increased by a factor of 10, the purity of the D2 should exceed 99.995%, since the HD impurity problem was one of noise; (2) better trapping than simple condensation at a 4 K surface must be employed. The present state-of-the-art is probably adequate to carry out detailed studies of reaction collisions between hydrogen atoms and deuterated hydrocarbons using electron impace ionization. (Author)

AD-428 723 Div. 25
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MIGRATION OF ELECTRONS IN A SPATIAL-PERIODIC HELICAL MAGNETIC FIELD,
by R. A. Demirkhanov and Yu. V. Kursanov.
7 Jan 64, 9p.
FTD TT63 1060 Unclassified report

Trans. from Zhurnal Tekhnicheskoy Fiziki, Vol. 33, pp. 1098-1103, 1963.

Descriptors: (*Electrons, Motions), (*Magnetic fields, Helixes), Energy, Charged particles, Resonance, Distribution, Electrical conductance, Electric currents, Equations, Surface properties, Orbital trajectories, Vecolcity, Solenoids.

An investigation was made of the migration of electrons in a magnetic field, obtained by the superposition of a longitudinal constant helical magnetic field and a transverse spatial-periodic one. With determined relationships among the longitudinal energy of the charged particle, the pitch of the helical winding, and the longitudinal and transverse magnetic fields there is observed a resonance redistribution of the energy between the energy of the longitudinal and transverse components. (Author)

AD-428 730 Div. 25, 6
OTS price $15.50

Southwestern Coll., Memphis, Tenn.
TIME-DEPENDENT INFRARED STUDIES.
Final rept,
by J. H. Taylor. Dec 63, 228p.
Contract AF19 604 4953, Proj. 7670, Task 767003
AFCRL 64 200 Unclassified report

Descriptors: (*Infrared research, Time), Infrared phenomena, Infrared radiation, Infrared spectroscopy, High altitude, Solar atmosphere, Transmissions, Vibration, Quantum mechanics, Calibration, Infrared Scanning.

The following work is covered in this report: A mobile observatory was built that enables one to take infrared spectroscopic and radiometric equipment on field expeditions. A 31 inch diameter (f/2) radiometer and PbS detector were used to study near infrared radiation from chemical releases during Project Firefly (July-August 1960). The High Altitude Observatory's 16in. diameter coronagraph was used in conjunction with a Perkin-Elmer Model 12C infrared spectrometer to observe the radiation from the solar atmosphere in the region from 0.936 - 2.173 microns. Spectra were obtained using a DF-2 prism and PbS detector. A Perkin-Elmer Model 112 (double pass) spectrometer was used to study solar spectra as a function of zenith angle of the sun. The spectrometer was equipped with a sodium chloride prism and a thermistor bolometer detector. A highly selective detector has been used in an attempt to measure the time required for converting the molecular vibrational energy of an infrared absorbing gas into translational energy. The detector is a Golay cell filled with the gas under investigation. The near infrared emission spectra of severalgases usually available in the laboratory are presented. These spectra have been most useful for prism calibrations. (Author)

AD-428 737 Div. 25
OTS price $4.60

RAND Corp., Santa Monica, Calif.
TWO CHARGED SPHERICAL CONDUCTORS IN A UNIFORM ELECTRIC FIELD. FORCES AND FIELD STRENGTH,
by M. H. Davis. Jan 64, 35p. Memo. no. RM3860PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Electrostatic fields, Spheres), (*Boundary value problems, Electrostatic fields), Drops, Colloids, Electrical conductance, Numerical analysis, Separation, Intensity, Equations, Capacitance, Electric fields, Electric potential, Trajectories.

A complete solution is presented to the electrostatic boundary value problem of two charged conducting spheres in a uniform electric field. Rapidly convergent expressions are given for the forces acting on the spheres, and for the maximum field strength between them. Numerical results are presented for a number of relative sphere sizes and separations. (Author)

AD-428 767 Div. 25
OTS price $1.10

Microwave Lab., Stanford U., Calif.
MICROWAVE RESEARCH.
Quarterly status rept. no. 19, 1 Aug-31 Oct 63.
Dec 63, 26p. Rept. no. 1122
Contract Nonr225 48
Unclassified report

Descriptors: (*Acoustics, Attenuation), (*Lasers, Ruby), Cadmium compounds, Sulfides, Magnetic fields, Plasma medium, Semiconductors, Interferometers, Ferrites, Propagation, Electron beams, Frequency modulation, Quartz.

AD-428 768 Div. 25
OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS.
Quarterly technical rept. no. 2.
1963, 10p.
Contract AF49 638 1245
Unclassified report

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Single crystals), (*Rare earth compounds, Single crystals), Epitaxial growth, Sodium compounds, Chlorides, Vapor plating, Electrostatic fields, Energy, Atomic properties, Bonding.

Small single crystals of EuS, EuSe, and EuTe were prepared by the iodine-transport method. Several modifications of this method were made in an effort to produce crystals of sufficiently large sizes for electrical studies. Epitaxy of EuS onto the (100) cleavage surface of NaCl single crystals was established in the vapor-deposition experiments. Partial single-crystal films were obtained with the NaCl substrates heated at 300C. The Th3P4 structure was studied from the viewpoint of either electrostatic energy or atomic bonding. Magnetic data for the sesquisulfides of Ce, Pr, Nd, Gd, Dy, Ho, Er, and Tm indicate that none of the sulfides would become ferromagnetic. A large effect of the substitution of Gd in Ho was observed upon the transition temperature of the paramagnetic to antiferromagnetic ordering. Work has been completed on an interesting electrical and magnetic anomaly in LaCoO3. This anomaly originates from a spin reversal within the d shell of the Co ion. Progress was made in the theory of neutron scattering from impurities and localized vibrational modes. (Author)

AD-428 771 Div. 25
OTS price $2.60

Technische Hochschule, Vienna (Austria).
INVESTIGATIONS CONCERNING Y-Mn AND Gd-Mn ALLOYS PREPARED BY THE AMALGAM PROCESS,
by F. Lihl. 31 Oct 63, 27p. TN6
Contract AF61 052 609
Unclassified report

Descriptors: (*Manganese alloys, Processing), Gadolinium, Yttrium, X-ray diffraction analysis, Samarium, Crystal lattices, Crystal structure, Mercury, Powder alloys, Symmetry (Crystallography).

By continuing the efforts to refine all methods, for which many improvements have been necessary, the whole amalgam process has been developed to a safe, reliable method. The Y-Mn system was chosen to test the whole procedure. Approximately 40 alloys with 7 different concentrations (20 - 90 w.% Mn) were prepared. The alloys consist of powders, which are free of contaminations and are in an equilibrium. The compounds YMn2 and YMn4 have been studied intensively. YMn2 is cubic, the lattice spacing (a = 7,692(5) plus or minus 0,001 A angstroms) was determined with far better accuracy than has been done up to now. (Author)

AD-428 783 Div. 25
OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
ON THE QUASI-STATIC ANALYSIS OF WAVES IN A PLASMA-FILLED WAVEGUIDE,
by J. E. Scharer and A. W. Trivelpiece.
25 Nov 63, 27p. Rept. no. 63 22
Contract AF19 628 324
Unclassified report

Descriptors: (*Waveguides, Plasma medium), (*Plasma medium, waveguides), (*Electromagnetic waves, Analysis), Power, Magnetic fields, Electromagnetic fields, Velocity, Light, Propagation, configuration, Gas ionization, Excitation, Recombination reactions.

The problem of determining the dispersion relations, electromagnetic field, and power flow in a cylindrical plasma-filled guide with a finite axial magnetic field is discussed. The quasi-static analysis used and the conditions for its validity are presented. The hybrid structure (coupled TE and TM modes with two eigenvalues) of the fields that is present in the exact analysis is brought out from an extension of the quasi-static analysis. It is shown that under certain conditions the dispersion relation and electromagnetic field derived from the quasi-static analysis agree with the exact solution even though the phase velocities for the wave modes are greater than the velocity of light.

AD-428 785 Div. 25, 4
OTS price $3.60

Tracer Lab. Inc., Waltham, Mass.
ANALYSIS OF IMPURITIES IN SOLID STATE ELECTRONIC MATERIALS.
Final rept.,
by John O'Connor. 1 Oct 63, 28p.
Contract AF19 604 7463, Proj. 4608, Task 460802
AFCRL 63 388 Unclassified report

Descriptors: (*Semiconductors, Gamma-ray spectroscopy), (*Gamma-ray spectroscopy, Semiconductors), (*Impurities, Gamma-ray spectroscopy), (*Lasers, Gamma-ray spectroscopy), (*Masers, Gamma-ray spectroscopy), Neutron activation, Silicon, Diamonds, Synthetic stones, Ruby, Garnet, Ion exchange, Non-destructive testing, Chemical analysis, Radioactivation analysis.

Use of gamma ray spectrometry greatly increases speed and flexibility of activation analysis. Detailed separation scheme given for determination of iron, copper, phosphorous and nickel in silicon using ion exchange. Non-destructive analysis of chromium in lasers and masers and gallium in yttrium iron garnets by activation analysis are described. Study of elution of Cu (II) from Dowex 1 resin is presented. (Author)

AD-428 788 Div. 25, 8
OTS price $2.60

Little, Arthur D., Inc., Cambridge, Mass.
SUPERCONDUCTIVE EFFECTS IN THIN FILMS.
Interim engineering rept. no. 7, 15 July-15 Oct 63,
by S. Shapiro and E. J. McNiff, Jr. 15 Nov 63, 19p. Rept. no. C64380
Contract AF33 657 7915
Unclassified report

Descriptors: (*Thin films (Storage devices), Superconductivity), Microwave equipment, Mixers (Electronic), Tunnel diodes, Experimental data, Electric currents, Power, Phase shifters, Resonators, Cavity resonators.

This report describes the mixing of two microwave signals which has been accomplished unambiguously in experiments employing the non-linear I-V characteristic of superconducting tunneling samples. Although a doubly-resonant microwave cavity was used in the earliest experiments, difficulties with cavity Q-values led to the adoption of a scheme in which the sample was situated roughly a quarter guide wavelength from the end of a shorted waveguide. The latter scheme, where the sample sees predominantly rf E-field, was very effective for both mixing and video detection. The 30 Mcps mixed signal was amplified and, finally, displaced on an oscillascope. The noise and rather low sensitivity of the post-mixer amplification and display arrangement precluded obtaining sufficient data for detailed analysis. (Author)

AD-428 793 Div. 25
OTS price $2.60

Polymer Research Inst., U. of Mass., Amherst.
THE SCATTERING OF LIGHT FROM THIN POLYMER FILMS V THEORY FOR SCATTERING FROM ORIENTED POLYMERS,
by R. S. Stein and T. Hotta. 8 Aug 63, 16p.
TR57
Contract Nonr335701, Proj. NR356 378
Unclassified report

Descriptors: (*Light, Scattering), (*Polymers, Thin films (Storage devices)), Crystals, Solids, Theory, Spheres, Polarization, Intensity, Vector analysis, Equations, Anisotropy, Refractive index, Density, Function, Volume, Correlation techniques.

AD-428 803 Div. 25, 2, 8
OTS price $8.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
DESIGN AND ANALYSIS OF AN INSTRUMENTATION SYSTEM FOR THE MEASUREMENT OF IONOSPHERIC CROSS-MODULATION,.
by R. L. Suttmiller. 15 Feb 64, 88p. SR205E
NSF Grant GP846
Unclassified report

Descriptors: (*Ionosphere, Modulation), (*Modulation, Measurement), (*Instrumentation, Design), Circuits, Analysis, Signal-to-noise ratio, Power, Sunspots, Reflection, Electron density, Earth, Atmosphere, Propagation, Experimental data, Radio waves.

In this report several methods for measuring amplitude interaction are considered; however, the basic concept as initiated by Fejer has been found the most suitable way of performing the measurement. The basic concepts as introduced by Fejer and the addition of some unique circuitry have been incorporated in the amplitude interaction instrumentation designed for this experiment. This instrumentation was successfully used to measure the interaction effect. The amplitude interaction system was evaluated in terms of the diurmal and seasonal variation of the signal-to-noise power ratio expected for a low sunspot period such as IQSY and high sunspot period. It has been predicted that the signal-to noise power ratio can vary during the day from five to one hundred during IQSY and from .01 to 30 during a high sunspot period. It was shown that this system can be used to detect weak echoes such as partial reflections. (Author)

AD-428 806 Div. 25
OTS price $11.50

Illinois U., Engineering Experiment Station, Urbana.
MEGAVOLT ELECTRONICS, SUB-MILLIMETER WAVE RESEARCH.
Annual rept. no. 4, 1 Sep 62-31 Aug 63,
by M. D. Sirkis, J. R. Baird, F. J. Rosenbaum, R. G. Heeren and Wm. E. Kunz. Dec 63, 144p.
Contract AF33 657 10224, Proj. 4156, Task 415604
RTD TDR63 4212 Unclassified report

Descriptors: (*Millimeter waves, Doppler effect), (*Doppler effect, Millimeter waves), Frequency, Power, Theory, Propagation, Cerenkov radiation, Anisotropy, Ferrites, Waveguides, Resistance (Electrical), Q band, Electron beams, Design.

Generation of millimeter wavelength radiation by means of the Doppler effect is discussed. In contrast to other rebatron experiments, the output frequency need not be a harmonic of the rebatron frequency and is therefore potentially tunable. Power has been generated at 39.7 Gc at the milliwatt level in substantial agreement with theory. An approxiamte method for calculating parameters appearing in the study of the propagation of Cerenkov radiation in anisotropic ferrites is presented. Theoretical studies of transition radiation in both stratified media and in waveguides are described. Numerical evaluation for the waveguide problem leads to interaction resistances of the order of 10 to 100 ohms. Information concerning the construction of the 35 Gc rebatron which is now ready for initial is presented. (Author)

AD-428 828 Div. 25, 8
OTS price $6.60

Stanford Electronics Labs., Stanford U., Calif.
DIFFUSION. SOLUBILITY. AND DISTRIBUTION COEFFICIENT OF ZINC IN GALLIUM ARSENIDE AND GALLIUM PHOSPHIDE.
by Leroy L. Chang. Oct 63, 59p. Rept. nos. 63 104, TR5104 1
Contract AF33 616 7726, Proj. 4159, Task 415904
RTD TDR63 4164 Unclassified report

Descriptors: (*Zinc, Diffusion). (*Gallium alloys, Phosphides). (*Gallium alloys. Arsenic alloys). Physical chemistry, Distribution, Solubility, High-temperature research, Radioactive isotopes, Tracer studies, Physical properties, Mathematical analysis, Mathematical models, Vapors, Solvent action, Semiconductors, Semiconductor devices, Temperature, Solvents, Molecular electronics, Intermetallic compounds.

Radiotracer Zn65 was vapor diffused in GaAs and GaP single crystals in closed, evacuated quartz ampoules. The solubilities and diffusion profiles were obtained over the temperature range 700 to 1100 C. The solubility data were analyzed by assuming Zn-GaAs and Zn-GaP to be binary systems and considering the transfer of neutral Zn from the liquid to the solid where some Zn atoms become ionized acceptors. The solubilities and distribution coefficients of Zn in these two semiconductor were calculated as functions of temperature up to the melting point of the solvents. The experimentally measured diffusion profile exhibit a steep front for Zn in GaAs above 700 C and for Zn in GaP above 900 C. Application of the Boltzmann-Matano method to these profiles shows that the diffusion coefficient is strongly concentration-dependent. A precise evaluation of this dependence was obtained from isoconcentration diffusions performed at a fixed temperature: 900 C for Zn in GaAs and 1000 C for Zn in GaP. (Author)

Division 25 - PHYSICS

AD-428 837 Div. 25, 30
OTS price $7.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PROBLEMS IN COMPUTING RADIATION CONTROL FUNCTIONS FOR MARK I.
by Cord H. Link, Jr. Feb 64, 64p.
Contract AF40 600 1000, Proj. SM2105
AEDC TDR63 206 Unclassified report

Descriptors: (*Thermal radiation, Measurement), (*Spacecraft, Flight paths), Earth, Perturbation theory, Solar radiation, Space flight, Simulation, Control sequences, Control simulators, Integrals, Illumination, Functions, Albedo (Astronomy), Computers, Real time, Orbital trajectories.

Studies in the field of space flight thermal radiation simulation to provide a system to compute real-time information about the intensity and distribution of thermal radiation fields illuminating a vehicle in space are presented. The details are limited to vehicles in near earth orbits, but the discussion is sufficiently generalized to indicate how transfer trajectories and alternate primary bodies may be incorporated. The time functions obtained may eventually control the sequencing of parameters in the Mark I aerospace environment simulator or at least provide an independent means to evaluate system performance when the simulator becomes operational. (Author)

AD-428 843 Div. 25
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
ELASTIC WAVE DECAY II,
by Paul Harris. Feb 64, 23p.
Task R360FR105 052
NOL TR63 219 Unclassified report

Descriptors: (*Shock waves, Propagation), Stresses, Elastic scattering, Crystals, Solids, Decay schemes, Attenuation, Materials, Copper, Harmonic analysis, Relaxation time, Partial differential equations, Deformation, Lithium compounds, Fluorides, Sodium compounds, Chlorides, Nonlinear differential equations.

A time dependent non-linear formulation of shock propagation in an originally isotropic medium is presented. It is postulated that such a formulation accounts for the known non-linearity of the dissipative mechanisms which result in the decay of elastic waves in crystalline solids. By combining this non-linear theory with the appropriate conservation equations, characteristics and characteristic equations are derived which explicitly contain dispersion and decay in terms of unknown functions of the solid medium in question. By applying theory and experimental data available from ultrasonics the functions of importance to the linear region are found. The growth and decay of the amplitudes associated with the first non-linear contributions are traced by seeking solutions of a non-linear wave equation and applying appropriate boundary conditions.(Author)

AD-428 844 Div. 25, 12, 1
OTS price $15.00

Giannini Controls Corp., Duarte, Calif.
EXPERIMENTAL RESEARCH OF SHOCK WAVE PERTURBATIONS TO OBTAIN VEHICLE VELOCITY. PHASE II.
Final rept. Apr 62-June 63,
by J. R. Rochester. Jan 64, 217p.
Contract AF33 616 7764, Proj. 8222, Task 822207
RTD TDR63 4108 Unclassified report

Descriptors: (*Reentry vehicles, Instrumentation), (*Spacecraft, Shock waves), Propagation, Velocity, Perturbation theory, Detectors, Plasma medium, Probes (Electromagnetic), Electric arcs, Gas discharges, Circuits, Power supplies, Aerodynamic heating, Measurement, Coils, Vacuum apparatus.

Experimental research in the generation, propagation and detection of ion density waves in a high velocity plasma is described. This work has been directed toward velocity measurement of the high speed plasma; in particular, the high-speed, shock excited plasma obtained upon hypersonic reentry into the earth's atmosphere. Ion density waves have been introduced into the plasmas by means of high intensity pulsed magnetic fields and have been observed by mechanical, microwave, electrostatic and optical probes. The properties governing the magnetic generations of the above described waves have been studied by varying the magnetic geometry pulse duration, rise time, and field intensity. Experimental work reveals that the plasma interaction magnitude varies as the fourth power of the magnetic field intensity rather than the assumed second power, and displays a threshold at approximately 350 gauss. Comparison of the various detector probes indicates the electrostatic probe, which works on a capacitive principle, to be the apparent best choice for applications to aerodynamic hardware. (Author)

AD-428 846 Div. 25
OTS price $3.60

Aerial Measurements Lab., Northwestern U., Evanston, Ill.
SOLID STATE ANALOG-TO-DIGITAL CONVERTER AND ELECTRON AND HOLE INJECTION BY A METAL-DEPLETION LAYER CONTACT.
Final rept.,
by Viola J. White, Robert E. Onley, P. G. Sedlewicz and C. R. Kannewurf. 30 Dec 63, 1v.
Memo no. 400
Contract NOw62 0749d
Unclassified report

Descriptors: (*Analog-to-digital converters, Solid state physics), (*Solid state physics, Analog-to-digital converters), Semiconductor devices, Crystals, Silicon, Transducers, Frequency, Measurement, Sampling, Shafts, Rotation, Microminiaturization (Electronics), Theory, Switching circuits.

This is the final report on research and development directed toward determining the feasibility of fabricating a solid-state analog-to-digital converter (or ADC). This research is based on the movement of the depletion region of a reverse biased p-n crystal of the silicon and the detection of this movement. (Author)

AD-428 853 Div. 25
OTS price $1.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
RESEARCH INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Technical quarterly progress rept., Sep-Nov 63,
by M. G. Foster. Jan 64, 13p. Rept. no. EMI3421 105 64U
Contract AF33 657 8352
Unclassified report

Descriptors: (*Bearings, Design), (*Servomechanisms, Resonance), Damping, Control systems, Flexible shafts, Flexible couplings, Deformation, Shear stresses, Loading (Mechanics).

Some measure of success is being obtained in redesign of magnetic-support bearings for rotating

machinery so as to make a practical design out of devices which have been found to support a rotating shaft in the laboratory. In particular, flexural vibration problems described in the last report are being subdued. (Author)

AD-428 865 Div. 25
OTS price $2.60

Antenna Lab., Ohio State U., Research Foundation, Columbus.
MICROWAVE THEORY AND THE BREAKDOWN OF GASES BY RUBY LASER RADIATION,
by Richard G. Tomlinson. 31 Dec 63, 19p.
Rept. no. 1579 7
Contract AF33 657 10824, Proj. 5237, Task 523704
Unclassified report

Descriptors: (*Lasers, Ruby), (*Microwaves, Theory), Diffusion, Pressure, Electron density, Power, Plasma medium, Gases, Transport properties, Equations, Motion, Optics.

Microwave breakdown theory is extrapolated to the 6943 Angstroms, ruby laser wavelength. The need for breakdown criterion other than that for the critical plasma frequency, sometimes used in microwave breakdown, is shown. A suitable criterion is developed from the solution of the electron density continuity equation, including recombination loss. A solution for the breakdown electric field strength, or power density, for the pulsed ruby laser in air as a function of pressure is obtained. The effect of varying pulse duration, initial electron density, and characteristic diffusion length is shown. A minimum power density of 10 to the 12th power watts/sq. cm is predicted for breakdown of air by ruby laser radiation. The extent of accuracy of the results of extrapolating microwave breakdown theory to optical laser breakdown is discussed; and there is speculation on the possibility of additional effects peculiar to laser breakdown. (Author)

AD-428 906 Div. 25, 6
OTS price $1.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
VERTICAL DIRECTIONALITY OF DEEP-OCEAN NOISE,
by William A. VonWinkle. 18 Dec 63, 11p.
Proj. SS050 000 1562
USL 600 Unclassified report

Descriptors: (*Noise, Oceans), (*Oceans, Noise), (*Direction finding, Noise), Oceanology, Frequency, Surface properties, Experimental data, Measurement, Wind, Velocity, Distribution, Underwater sound signals, Isotropism.

An experimental program utilizing a 300-foot vertical array of receivers mounted near the ocean floor in 2400 fathoms has been completed and provides information from which the vertical directionality of deep-ocean noise as a function of frequency and sea-surface condition can be inferred. Data are presented for the frequency range 112-1120 cps, based on logit band measurements, as a function of surface-wind speed and waveheight corresponding to sea-state numbers from one through six. The ability to electrically steer the array through a variety of angles of elevation provides a reasonably well-defined distribution. (Author)

AD-428 908 Div. 25, 8
OTS price $1.60

Michigan U. Coll. of Engineering, Ann Arbor.
MICROWAVE-PLASMA COMPONENTS STUDY,
by Andrejs Olte and E. K. Miller. Dec 63, 15p.
Contract AF30 602 2605, Proj. 5573, Task 557301
RADC TDR63 509 Unclassified report

Descriptors: (*Circuits, Microwaves), (*Waveguides, Cyclotron resonance phenomena), Plasma physics, Absorption, Electromagnetic fields, Vacuum apparatus, Field theory, Transmission lines, Resonance.

An equivalent microwave circuit is proposed to exhibit the main features of the electron cyclotron resonance interaction in a waveguide. The essential part of the circuit consists of a nonreciprocal transmission line and similarly coupled resonant circuit. The experimental effort on the plasma package is discussed and some experimental difficulties reviewed. (Author)

AD-428 932 Div. 25
OTS price $3.60

Little, Arthur D, Inc., Cambridge, Mass.
MEASUREMENT OF OPTICAL CONSTANTS AT HIGH TEMPERATURES.
Final rept.,
by W. S. Martin, E. M. Duchane, and H. H. Blau, Jr.
10 Dec 63, 26p.
Contract AF19 604 7485, Proj. 5634, Task 563401
AFCRL 63 547 Unclassified report

Descriptors: (*Metals, Single crystals), (*Optical properties, Measurement), High-temperature research, Tungsten, Molybdenum, Niobium, Optical equipment, Emissivity.

A new method for accurately measuring the optical constants of metals at high temperatures is described. Data obtained using this method to study single crystals of tungsten, molybdenum and columbium is presented and discussed. (Author)

AD-428 934 Div. 25
OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
AN EXPERIMENTAL INVESTIGATION OF GAS-DRIVEN UNDERWATER SOUND DEVICES,
by Richard D. Fulmer. Oct 63, 40p.
NAVWEPS 8364; NOTS TP3262
Unclassified report

Descriptors: (*Underwater sound signals, Propellants), (*Underwater propulsion, Rocket propellants), Gases, Pressure, Tests, Sonar pulses, Sonar equipment, Nitrogen, Generators, Spectrum analyzers.

A number of concepts for generating underwater acoustic signals using the energy in chemical propellants were studied. Two of the more promising, a valved gas device and a vortex whistle, were singled out for experimental investigation. The valved gas device,named the Gas Actuated Sonar Pulser (GASP), could be used either as a diaphragm-type unit or as a device for pulsing pressurized gas directly into the water. The vortex whistle, an extremely simple device, produces a tone whose frequency is proportional to the flow rate of working fluid passing through the system. Data were obtained on wide-band acoustic pressures and signal spectral content as functions of operating gas pressures for both devices. In these tests, the propellant gases were simulated with compressed nitrogen. Directionality tests were also run on the vortex whistle. In both devices the signal quality was not very good and efficiencies were very low. For a cheap, expendable unit, however, the vortex whistle might prove to be quite useful. (Author)

AD-428 961 Div. 25, 14
OTS price $1.10

Laboratory For Insulation Research, Mass. Inst. of Tech., Cambridge.
(No title).
Final rept.
1963, 7p.
Grant AFOSR62 317
AFOSR J1342 Unclassified report

Descriptors: (*Lasers, Scientific research), (*Research program administration, Reviews), Glass, Impurities, Emissivity, Europium, Neodymium, Silicates, Tungstates, Ions, Excitation, Ultraviolet radiation, Resonators, Ruby, Absorption spectrum, Chromium, Relaxation time, Secondary emission, Interferometers, Spectroscopy, Titanates, Barium compounds, Crystal lattices, Vibration, Absorption, Rare earth elements, Transition elements, Thulium, Fluorescence, Solid state physics, Solids, Crystals.

The work described represents a number of advances in understanding of the physics of solid state optical masers. There is much still to be learned of the detailed mechanisms important in the response of matter to high intensity optical fields. Of the various aspects of coherent light generation, it was decided that the most useful contribution which this laboratory can make to the field is the development of infrared sources and spectroscopic and relaxation time measurements in solids and gases with resonances, in the submillimeter region. (Author)

AD-428 976 Div. 25, 9
OTS price $1.10

Innsbruck U. (Austria).
ON THE RELATION BETWEEN LOUGHEAD'S PAPER ON ONE DIMENSIONAL STEADY MHD-FLOW AND THE CAP THEORY,
by G. Kerer. 1963, 7p. Technical note no. 5
Contract AF61 052 675
Unclassified report

Descriptors: (*Magnetohydrodynamics, Equations), Gases, Dynamics, Gas ionization, Gas flow, Fluid flow, Theory, Electric potential, Motion, Electrical conductance, Adiabatic gas flow, Magnetic fields, Thermodynamics.

AD-428 978 Div. 25, 20
OTS price $2.60

Alco Products Inc., Schenectady, N. Y.
EFFECT OF AN INCONEL STEAM GENERATOR ON DEPOSITED ACTIVITY AND WATER TREATMENT OF THE PM-2A,
by Carl A. Bergman. 25 Mar 60, 29p.
Contract DA30 347eng284
AEC AP Note 239 Unclassified report

Descriptors: (*Nuclear reactors, Steam power plants), (*Steam power plants, Corrosion-resistant alloys), (*Corrosion-resistant alloys, Stainless steel), (*Neutron reactions, Radiation damage, (*Radioactive isotopes, Cobalt), Nickel alloys, Chromium alloys.

An analysis was made of the effects of an Inconel steam generator on activity deposition in the system. Equations were derived for determining amounts of activated corrosion products released from in-flux and out-of-flux surfaces. The results permit comparison of predicated activity from a 50% Inconel-50% stainless steel system with activity from an all stainless steel system. A discussion of the methods of treatment of the primary and secondary waters in contact with an Inconel steam generator was given. (Author)

AD-428 980 Div. 25
OTS price $10.50

Sylvania Electric Products Inc., Mountain View, Calif.
RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION.
Interim engineering rept. no. 6, 1 Sep-1 Dec 63,
by E. O. Ammann, R. Targ, S. E. Harris and J. Gaenzle. 1 Dec 63, 128p.
Contract AF33 657 8995
Unclassified report

Descriptors: (*Light, Modulation), (*Detection, Modulation), (*Modulation, Light), Frequency modulation, Demodulation, Demodulators, Measurement, Theory, Optical equipment, Amplitude modulation, Oscillators, Single sideband communication systems, Discriminators.

This report describes work on heterodyne demodulation and direct demodulation of FM light. Results are given in the following areas: (1) experimental measurements on the optical ratio detector are described; (2) theoretical work resulting in two techniques for realizing any desired optical frequency characteristic is described. This work paves the way for a second generation of birefringent devices designed specifically to meet some system specification; (3) heterodyne and homodyne techniques for the demodulation of AM and FM microwave-modulation light are demonstrated; and (4) an AFC local oscillator using single-sideband suppressed-carrier modulation to control its frequency is investigated for use in an optical heterodyne receiver. (Author)

AD-428 989 Div. 25, 22
OTS price $8.10

North American Aviation Inc., Columbus, Ohio.
HARDENED GROUND RADOMES FOR SYSTEM SURVIVAL.
Final rept.,
by G. J. Cook. Dec 63, 72p. Rept. no. NA63H1035
Contract AF30 602 2923, Proj. 5579, Task 557901
RADC TDR63 487 Unclassified report

Descriptors: (*Radomes, Nuclear explosion damage), (*Air burst, Mathematical analysis), Blast, Hardening, Mathematical models, Spheres, Structural shells, Shock (Mechanics), Shock waves, Failure (Mechanics), Strain (Mechanics), Simulation, Analog computers.

This investigation consists of determining the dynamic response of a thin, uniform-thickness, truncated spherical shell to air-blast induced shock loads. The response analysis includes a failure criterion for determining the vulnerability of this type of structure to nuclear blasts. The structural dynamic characteristics of the radome were represented by the normal mode approach. The mathematical representation of the blast-induced pressure loading was based on published experimental data. A failure criterion based on strain energy considerations is suggested, which, when applied to the dynamic response is indicative of structural failure. Solutions to this mathematical model were obtained from an operational analog computer. The results of this study are promising; however, further investigations considering radomes of different materials and various height-to-diameter ratios are required to substantiate the generality of this approach. (Author)

AD-428 994 Div. 25, 20, 14
OTS price $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
INVESTIGATION OF TRANSIENT RADIATION DAMAGE IN

SEMICONDUCTOR MATERIALS.
Quarterly progress rept. no. 2, 1 May-31 July 63,
by Roland M. Lichtenstein. 31 July 63, 4p.
Contract DA36 039AMC02165E, Task OST59 74 01 004 36 00

Unclassified report

Descriptors: (*Semiconductors, Radiation damage), (*Radiation damage, Semiconductors), Radiation effects, Transients, Materials, X-ray flashes, Silicon, Amplifiers, Shielding, Electric cables, Electrical conductance, Relaxation time.

The effect of X-ray flashes (produced by the Linac) on small silicon samples was examined. The amplifier and associated shielded cables performed as expected. Coincident with the X-ray flash, the electrical conductance of the silicon sample increased suddenly and then returned to its normal value with a relaxation time of about five microseconds. (Author)

AD-428 995 Div. 25
OTS price $.75

Monsanto Research Corp., Dayton, Ohio.
STUDIES IN SOLID STATE MASS SPECTROMETRY.
Rept. for 1 July 62-1 July 63,
by F. N. Hodgson and J. E. Katon. Dec 63, 23p.
Contract AF33 616 8465, Proj. 7360, Task 736005
RTD TDR63 4145 Unclassified report

Report on Materials Analysis and Evaluation Techniques.

Descriptors: (*Mass spectroscopy, Solid state physics), (*Solid state physics, Mass spectroscopy), Mass spectroscopy, Carbon, Molecules, Sparks, Graphite, Diamonds, Carbides, Atoms, Experimental data, Gas ionization, Hydrogen.

Molecular carbon species present in the vacuum spark of the mass spectrograph were studied for various forms of carbon. Included in the study were graphite, diamond, amorphous carbon and carbides. Each form shows a unique carbon association pattern with groups of carbon atoms appearing only to C(8) or C(9) for amorphous carbon as compared to C(28) for graphite and to C(24) in earlier data on fused aromatic structures. Special techniques were developed to run volatile samples, to ionize gases in the spark source and to produce a mass reference plate based on spark spectra containing combinations of carbon (At. Wt. 12.000) and hydrogen (At. Wt. 1.0078). Kodak SWR photographic plates were investigated and found satisfactory for special applications. A method for quantitative impurities analysis is outlined and is illustrated by a determination of oxygen in beryllium. Results are compared with data from various techniques performed in other laboratories. The present state of performance of the gas inlet and Knudsen cell sources is discussed. (Author)

AD-429 003 Div. 25, 8
OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
PHOTON-INDUCED FREE-CARRIER MODULATION OF INFRARED LIGHT IN GERMANIUM,
by Ralph M. Grant. Jan 64, 16p. Rept. no. 4563 55T
Contract AF33 616 8365

Unclassified report

Descriptors: (*Photons, Infrared radiation), (*Infrared radiation, Photons), (*Germanium, Infrared radiation), (*Modulation, Infrared radiation), Experimental data, Intensity, Theory, Energy, Life span, Absorption, Valence, Electrons, Transmission.

The theoretical framework necessary to explain the modulation of an infrared beam by photon-induced free-charge carriers is briefly reviewed. An experiment is described which demonstrates that variations in the density of free-charge carriers in germanium can modulate the intensity of an infrared beam transmitted by the germanium. (Author)

AD-429 008 Div. 25, 4
OTS price $4.60

Tennessee Valley Authority, Norris.
HEATS OF FORMATION OF PHOSPHORUS OXIDES.
Progress rept. 1 June-30 Nov 63,
by E. P. Egan, Jr. and B. B. Luff. 30 Nov 63, 44p.

Unclassified report

Descriptors: (*Phosphorus compounds, Heat of formation), Oxides, Calorimeters, Acrylic resins, Cellulose acetate, Coatings.

Contents: Phosphorus Coated with Lucite, Phosphorus Coated with Cellulose Acetate, Evaluation of the Combustion Results, Sample Calculation of Corrections for Combustion of Phosphorus Coated with Cellulose Acetate, and Heat of Combustion of Phosphorus.

AD-429 010 Div. 25, 14
OTS price $10.50

Corning Glass Works, N. Y.
GLASS LASER RESEARCH.
Annual technical rept., May 62-June 63,
by T. C. MacAvoy, M. L. Charters, R. D. Maurer, W. H. Dumbaugh and N. F. Borrelli. 28 June 63, 128p.
Contract Nonr383300, Proj. 7300; ARPA Order 306 62

Unclassified report

Descriptors: (*Lasers, Glass), (*Glass, Lasers), (*Neodymium, Lasers), (*Fluorescence, Lasers), Impurities, Absorption spectrum, Emissivity, Silicates, Borates, Stability, Life expectancy, Copper compounds, Nickel compounds, Iron compounds, Cobalt compounds, Manganese compounds, Yttrium compounds, Rare earth compounds, Ions, Quenching (Inhibition), Refractive index, Tables.

A study of the spectral properties of Nd-doped glasses was undertaken with the objects of (1) determining how the properties of glass influence the performance of an Nd-doped glass laser, and (2) developing the best possible glasses for high power applications. The work consists of an extensive study of a wide variety of different glass compositions in parallel with a detailed study of the spectral properties of one glass. Emphasis was on silicate glasses, which show the longest lifetimes and most intense fluorescence. Borates show the shortest lifetimes and weakest fluorescence. Since oscillator strengths are about equal for all glasses studied, the borates are apparently quenched. Certain impurities such as Fe, Cu and Ni, quench the Nd fluorescence. (Author)

AD-429 030 Div. 25
OTS price $1.60

Laboratories for Applied Sciences U. of Chicago, Ill.
RESEARCH ON EFFECTS OF ARC FLUCTUATIONS ON SPECTROSCOPICALLY DETERMINED TEMPERATURES IN

ARC PLASMAS.
Quarterly progress rept., no. 1, 1 May-31 July 63,
by Jay Burns. 31 July 63, 12p. Rept. no. SR239 3
Contract AF33 657 10856
Unclassified report

Descriptors: (*Electric arcs, Plasma medium), (*Plasma medium, Electric arcs), Temperature, Spectroscopy, Plasma jets, Generators, Turbulence, Gas ionization, High speed photography, Acoustics, Noise, Temperature, Measurement, Argon, Photocathodes.

AD-429 039 Div. 25, 9
OTS price $11.00

Stanford Research Inst., Menlo Park, Calif.
STUDIES IN AXIALLY SYMMETRIC WAVE PROPAGATION PROBLEMS IN PLASTIC AND HYDRODYNAMIC MEDIA,
by C. M. Ablow, Y. Rajapakse and Sathyanarayana V. Hanagud. Nov 63, 145p.
Contract AF29 601 4965, Proj. 1080, Task 108001
RTD TDR63 3061 Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Materials, Hydrodynamics), (*Plasticity, Mechanical waves), (*Elasticity, Mechanical waves), Motion, Equations, Volume, Shear stresses, Deformation, Numerical methods and procedures, Strain (Mechanics).

Part I of this report outlines a finite difference method for computing the motions of a general elasto-plastic-hydrodynamic material. The constitutive equations are in the form proposed by Grigorian and thus include both volume and shear plasticity. The method is based on the theory of characteristics and therefore provides accurate following of main wave fronts. However, the advantages of a mesh fixed in advance are retained behind the wave fronts by considering elementary waves passing through branches of the mesh. The difference equations were established and a computing procedure described, but no solutions were obtained. Part II describes the solution of some relatively simple flow problems in locking solids. The spherical case was solved in detail, using both analytical and characteristic numerical methods; a special class of solutions for the axially symmetric problem was obtained, and the characteristic difference procedure for numerical solutions were formulated. (Author)

AD-429 041 Div. 25
OTS price $4.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
DYNAMIC ANALYSIS OF GRAVITY GRADIENT SATELLITE WITH PASSIVE DAMPING,
by J. L. Vanderslice. June 63, 42p. Rept. no. TG502
Contract NOw62 0604
Unclassified report

Descriptors: (*Satellites (Artificial), Damping), Dynamics, Analysis, Gravity, Energy, Power, Magnetic properties, Torque, Differential equations, Digital systems, Simulation, Springs, Viscosity, Orbital trajectories, Spin, Magnetic fields.

AD-429 090 Div. 25
OTS price $1.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
RESEARCH ON EFFECTS OF ARC FLUCTUATIONS ON SPECTROSCOPICALLY DETERMINED TEMPERATURES IN ARC PLASMAS.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 63,
by William Brubaker, Jay Burns, Henry Halle, Edward Pekol and Edward Yelke. Nov 63, 16p.
Rept. no. SR239 6
Contract AF33 657 10856
Unclassified report

Descriptors: (*Plasma jets, Turbulence), Audiofrequency, Acoustics, Instrumentation, Plasma physics, Gas ionization, Jet flames, High speed photography, Spectrum analyzers, Spectroscopy.

AD-429 109 Div. 25
OTS price $1.10

RAND Corp., Santa Monica, Calif.
NOTE ON CONDUCTIVE HEAT TRANSFER FROM A FINE WIRE,
by F. C. Hurlbut. Jan 64, 7p. Rept. no. P2843
Unclassified report

Descriptors: (*Heat transfer, Wire), Thermal conductivity.

The analysis of thermal conductive heat transfer from a fine wire is extended to include arbitrary values of the thermal accommodation coefficient, alpha. The implications for experimental studies of alpha are examined with particular reference to the criterion for the applicability of free molecule flow theory in the interpretation of results. (Author)

AD-429 133 Div. 25
OTS price $5.60

Ford Instrument Co., Long Island City, N. Y.
LO-TEMP THERMIONIC PLASMA STUDY.
Annual rept.,
by M. Silverberg and L. L. Haring. Dec 63, 44p.
Contract Nonr341600, Proj. NR099 356
Unclassified report

Descriptors: (*Diodes, Low temperature research), (*Thermionic converters, Plasma physics), Design, Cesium, Cylindrical bodies, Tungsten, Energy conversion, Temperature, Pressure, Geometry, Electron guns, Electric currents, Tests.

An experimental program was conducted in which the low temperature, impregnated tungsten, cesium diode was extended from its original planar configuration to a cylindrical geometry. Various cylindrical converters were designed, fabricated and operated in both steady state and pulsating modes. A multiple collector device to evaluate and compare different collector materials in the same diode environment was designed and fabricated. (Author)

AD-429 152 Div. 25
OTS price $4.60

McDonnell Aircraft Corp., St. Louis, Mo.
INVESTIGATION OF MAGNETOHYDRODYNAMIC WAVES.
VOLUME I. SUMMARY.
Final rept.,
by C. D. Joerger. 30 Nov 63, 40p. Rept. no. A219
Contract AF19 628 239
AFCRL 63 782, Vol. 1 Unclassified report

Descriptors: (*Magnetohydrodynamics, Electromagnetic waves), (*Electromagnetic waves, Magnetohydrodynamics), Experimental data, Design, Tests, Theory, Analysis, Plasma medium, Propagation, Detection, Atmosphere, Energy, Electromagnetic fields, Gas ionization.

This report, Volume I, is one of a series of three volumes reporting the following work: The investigation by theory and experiment of the pertinent factors influencing the creation, propagation and detection of a type of magnetohydrodynamic wave, and the Alfven wave, in a

partially ionized, low density medium. The theoretical aspects of MHD waves generated under ionospheric conditions, and their corresponding excitation in a simulated environment are investigated. The experimental design is reported and subsequent test results of wave propagation in three plasma facilities, a hypervelocity impulse tunnel, an electromagnetic shock tube and an arc discharge tube. This report summarizes the results of the experimental program and outlines the theoretical work performed in support of the experiments. (Author)

AD-429 153 Div. 25
OTS price $13.00

McDonnell Aircraft Corp., St. Louis, Mo.
INVESTIGATION OF MAGNETOHYDRODYNAMIC WAVES. VOLUME II. THEORY.
Final rept.,
by C. D. Joerger. 30 Nov 63, 175p. Rept. no. A219
Contract AF19 628 239
AFCRL 63 782, Vol. 2 Unclassified report

Descriptors: (*Magnetohydrodynamics, Electromagnetic waves), (*Electromagnetic waves, Magnetohydrodynamics), Theory, Plasma medium, Equations, Propagation, Magnetic fields, Analysis, Ionospheric propagation, Simulation, Shock tubes, Shock waves, Frequency, Gas ionization.

This report, Volume II, is one of a series of three volumes, reporting the following work: The investigation by theory and experiment of the pertinent factors influencing the creation, propagation and detection of a type of magnetohydrodynamic wave, the Alfven wave, that could exist in a partially ionized, low density medium. The theoretical aspects of magnetohydrodynamic waves, as might be generated under ionospheric conditions and excited in a simulated environment, are investigated in this report. Experimental design and subsequent test results of wave propagation in three McDonnell plasma facilities, are reported in Volume III. Volume I of this series provides the reader with a brief summary of Volumes II and III. (Author)

AD-429 154 Div. 25
OTS price $13.00

McDonnell Aircraft Corp., St. Louis, Mo.
INVESTIGATION MAGNETOHYDRODYNAMIC WAVES. VOLUME III. EXPERIMENTS.
Final rept.,
by C. D. Joerger. 30 Nov 63, 179p. Rept. no. A219
Contract AF19 628 239
AFCRL 63 782, Vol. 3 Unclassified report

Descriptors: (*Magnetohydrodynamics, Electromagnetic waves), (*Electromagnetic waves, Magnetohydrodynamics), Experimental data, Shock waves, Calibration, Instrumentaion, Air, Helium, Magnetic fields, Shock tubes, Excitation, Gas ionization, Energy, Contamination, Detectors.

This report is one of a series of three volumes reporting the following work: The investigation of factors influencing the creation, progagation and detection of a type of magnetohydrodynamic wave, the Alfven wave, that can exist in a partially ionized, low density medium. The theoretical aspects of MHD waves, as might be generated under ionospheric conditions and excited in a simulated environment, are covered in Volume II. This report describes the experimental design and subsequent test results of wave propagation experiments in three plasma facilities, a hypervelocity impulse tunnel, and electromagnetic shock tube and an arc discharge tube. Volume I of this series provides the reader with a brief summary of Volumes II and III. (Author)

AD-429 163 Div. 25
OTS price $1.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
INVESTIGATION OF ELECTROLYTIC HEAT TREATMENT,
by Edward J. Jankowsky. 17 Dec 63, 14p.
NAEC AML 1835 Unclassified report

Descriptors: (*Electrolytic cells, Heat treatment), Thermodynamics, Heating, Electrolytes, High-temperature research.

This investigation of electrolytic heating covered the basic parameters of the process including current-voltage relationships, specimen geometry, and electrolyte composition. It was found that the process is well suited to the heat treatment of small parts of relatively simple geometry. In addition, it is felt that the process can be adapted to more complex parts by suitable use of masking and specimen orientation in the electrolyte. Another advantage of the process is the low capital cost of the necessary equipment. (Author)

AD-429 179 Div. 25
OTS price $2.80

Westinghouse Electric Corp., Pittsburgh, Pa.
A PULSED HYPERSONIC TECHNIQUE AND SOME ATTENUATION MEASUREMENTS IN QUARTZ AT LOW TEMPERATURES,
by J. de Klerk and D. I. Bolef. 1 Nov 63, 1v.
SR4
Contract AF19 604 8826, Proj. 4600, Task 460003
AFCRL 63 564 Unclassified report

Descriptors: (*Quartz, Excitation), (*Attenuation, Measurement), Single crystals, Pulse generators, Hypersonic characteristics, Oscilloscopes, Propagation, Probes (Electromagnetic), Transducers, Shear stresses.

Conventional pulsed surface excitation of quartz in the kilomegacycle range of frquencies almost invariably produces non-exponentially decaying echo envelopes, making reliable attenuation measurements difficult. This difficulty can frequently be overcome by the use of conventional transducers and by careful bonding techniques. This transducer technique, methods of simultaneously generating compressional and shear modes in quartz and a tunable cavity capable of being operated over a wide frequency range are described. Applications of this equipment to the measurement of attenuation of hypersound in single crystal quartz as a function of transmitter power and of temperature below 20 K are briefly described. (Author)

AD-429 182 Div. 25
OTS price $16.50

Michigan U., Ann Arbor.
INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER,
by Richard E. Balzhiser, Robert E. Barry, Herman Merte, Jr., C. Phillip Colver and Andrew Padilla, Jr. Nov 63, 241p.
Contract AF33 616 8277, Proj. 3145, Task 314507
RTD TDR63 4130 Unclassified report

Descriptors: (*Liquid metals, Heat transfer), (*Boiling, Liquid metals), Boiling, Potassium, Liquid metal pumps, Sodium, Heat exchangers, Liquid metal cooled reactors, Instrumentation, Design, Thermodynamics.

Contents: Saturated Pool Boiling of Potassium up to Burnout Heat Fluxes, Film Boiling of Potassium, Forced Circulation Studies, Two-Phase Flow Investigations, Two-Phase Pressure Drop Study, Void Fraction Study, and Liquid Metal Boiling in Agravic Fields.

Division 25 - PHYSICS

AD-429 183 Div. 25, 4
OTS price $3.60

Revere, Althea, Vineyard Haven, Mass.
ELECTRON MICROSCOPE STUDIES OF THE SURFACE STRUCTURE OF WHISKERS GROWN FROM IRON CHLORIDE,
by Althea Revere. Nov 63, 29p.
Contract AF33 657 8554, Proj. 7353, Task 735304
ASD TDR63 4136 Unclassified report

Descriptors: (*Epitaxial growth, Iron compounds), Surfaces, Crystal structure, Chlorides, Cobalt, Electron microscopes, Electron diffraction analysis, Spark shadowgraph photography, Photographic analysis.

In continuing the investigation of iron whiskers by electron microscopy, additional evidence was obtained concerning the mechanism of filamentary growth as it is reflected in surface structure. During the past year whisker specimens were produced under new types of growth conditions with ultra-pure ferrous chloride containing small amounts of cobaltous chloride at 700 C. Although individual whiskers within each specimen boat may vary somewhat, their surface topography appears to follow definite patterns. In most specimens, regardless of growth conditions, these typical patterns show variation in surface structure from the base to the tip areas. Detail in surface contours appears to be more uniform in whiskers which develop well-formed tips. When whiskers grown with the addition of cobaltous chloride could be broken, their fractured cross-section surfaces exhibited a shell and core structure similar to that found in whiskers which were previously studied in this program. (Author)

AD-429 188 Div. 25
OTS price $8.10

Frick Chemical Lab., Princeton U., N. J.
ON THE THEORY OF RATES OF DISSOCIATION AND RECOMBINATION OF DIATOMIC MOLECULES,
by Neil S. Snider. 1 Jan 64, 80p. Technical rept. no. 5
Contract Nonr185826, Proj. NR357 275
Unclassified report

Descriptors: (*Diatomic molecules, Reaction kinetics). (*Dissociation, Diatomic molecules). (*Recombination reactions, Diatomic molecules). Kinetic theory, Oxygen, Argon, Tables, Mathematical analysis, Differential equations, Integral equations, Quantum mechanics, Probability, High temperature research, Chemical equilibrium.

This work was mainly concerned with two problems in the theory of dissociation and recombination of diatomic molecules. The first problem was to make a quantitative statement of the conditions under which it is valid to say that k sub d/k sub r = k sub d where k sub d and k sub r are the rate constants for far from equilibrium dissociation and recombination and k sub d is the thermodynamic equilibrium constant for the reaction. The second problem was to determine the effect on k sub d of the variation of transition probabilities and vibrational level spacings with the angular momentum of the molecule. (Author)

AD-429 189 Div. 25
OTS price $1.60

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
ELECTRIC QUADRUPOLE INTERACTIONS IN RARE EARTH IONS,
by A. J. Freeman and R. E. Watson. Dec 63, 10p.
DA Proj. 1H024401A110
AMRA TR63 33, MRL139 Unclassified report

Descriptors: (*Quadrupole moments, Rare earths), Ions, Electric fields, Nuclear spins.

Electric quadrupole interactions in rare earth ions arising from electric field gradients due to valence electrons (q sub 4f) and/or crystal fields external to the ion (q sub lat) are discussed. The contribution of the Sternheimer antishielding factors to both q sub 4f and q sub lat are calculated for the Ce(3+) ion using the method (based on the unrestricted Hartree-Fock formalism) reported earlier. The ionic antishielding factor is -73.5 and it is found that the total ionic contribution to the electric field gradient can be comparable in magnitude (and may be opposite in sign) with the valence electron contribution (augmented by the internal antishielding factor). The possible relation of these results to the temperature dependence of measured electric quadrupole interactions is noted. (Author)

AD-429 196 Div. 25, 15
OTS price $8.60

RAND Corp., Santa Monica, Calif.
AN ANALYTIC FORMULATION OF EQUATIONS OF STATE,
by D. J. McCloskey. Feb 64, 73p. Rept. no. RM3905PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Equations of state), Analysis), (*Metals, Thermodynamics), Entropy, Programming (Computers), Hydrodynamics, Temperature, Differential equations.

A general equation of state is presented that provides a suitable description of the thermodynamic behavior of metals over a very wide range of temperature and compression. The thermodynamic dependence of pressure and specific internal energy upon temperature and compression is described by equations having coefficients that can be related to measured or calculated physical variables. This makes such a formulation useful in assaying the effect of the parametric variation of the equation of state on hydrodynamic calculations. A description of the physical basis of the terms in the equation of state is given. The calculation of the specific entropy is reviewed and a method of calculation of Hugonoit points is presented. A summary of the program that has been written for machine calculation of the equation of state is given, along with the appropriate input instructions. (Author)

AD-429 197 Div. 25
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
EXCHANGE INTERACTION BETWEEN PAIRS OF CHROMIUM IONS IN RUBY,
by P. Kisliuk and W. F. Krupke. 18 Nov 63, 30p.
Rept. no. TDR169 3250 24TN2
Contract AF04 695 169
SSD TDR63 417 Unclassified report

Descriptors: (*Chromium, Line spectrum), (*Absorption spectrum, Ruby), Perturbation theory, Ions, Temperature, Theory, Spectroscopy, Atomic energy levels, Functions, Energy, Emissivity, Fluorescence.

The temperature dependence of the absorption of the spectral lines due to pairs of chromium ions in concentrated ruby at 7009 and 7041 Angstroms is fitted to theory by assuming isotropic exchange coupling. Other frequencies predicted from the parameters thus determined are identified in the observed spectrum. Higher states are identified by means of the excitation spectrum

and the spacings already known from the identification of the lower levels. To a closer approximation, it is found that the ground state splitting can be fitted within the experimental error using isotropic exchange if a biquadratic term is included, in addition to the usual quadratic term. Furthermore, the ratio of the coefficients of these terms is of the same order as that found in other materials and predicted by theory. The excited states, however, do not appear to fit a theory based on isotropic exchange coupling as the sole perturbation. (Author)

AD-429 199 Div. 25, 4
OTS price $7.60

Aerospace Corp., Los Angeles, Calif.
MASS SPECTROMETRY AND THE PROPERTIES OF CONDENSED SYSTEMS AT HIGH TEMPERATURES,
by P. Breisacher. 27 Dec 63, 53p. Rept. no. TDR269 4210 10 3
Contract AF04 695 269
SSD TDR63 349 Unclassified report

Descriptors: (*Mass spectroscopy, High-temperature research), (*High-temperature research, Mass spectroscopy), Tables, Reviews, Bibliographies, Data, Ions, Metals, Carbides, Halides, Hydroxides, Oxides, Sulfides, Thermodynamics, Enthalpy, Heat of sublimation, Heat of reaction.

A general discussion of the applicability of mass spectrometry toward the study of high temperature systems is given. Specific attention is given to the methods of ion generation, experimental techniques, and interpretation of the results obtained. A summary of all work performed in this area of investigation during the last four years is given in tabular form. (Author)

AD-429 228 Div. 25
OTS price $2.60

Uppsala U. (Sweden).
QUANTUM THEORY OF MANY-PARTICLE SYSTEMS.
Final rept., 1 Jan 60-31 Aug 63.
31 Aug 63, 24p.
Contract AF61 052 351
ARL 63 246 Unclassified report

Descriptors: (*Quantum mechanics, Elementary particles), Chemistry, Theory, Electrons, Perturbation theory, Momentum, Numerical methods and procedures, Atomic properties, Molecular structure, Solids, Hydrogen, Atoms.

AD-429 250 Div. 25, 20
OTS price $11.00

Edgerton Germeshausen and Grier, Inc., Boston, Mass.
ENERGY- AND RATE-DEPENDENCE STUDIES.
Final rept.
by R. K. Durkee, A. C. Lucas, N. B. York, T. S. Dahlstrom and G. E. Blair. 1962, 139p. Rept. no. S237R
Contract DA49 1860RD1059
Unclassified report

Descriptors: (*Dosimeters, Scientific research), Energy, X-rays, Radioactive isotopes, Linear accelerators, Neutrons, Dosage, Instrumentation, Silver, Phosphate glass, Cobalt, Luminescence, Diodes, Fluorescence, Detectors.

Dosimeter systems of silver-activated phosphate glass rods, cobalt glass plates, and manganese-activated calcium fluoride were evaluated for their response to gamma rays, electrons, and neutrons. Response to gamma rays in the energy region from .022 to 15 Mev, rate dependence from 10 r/sec to 10 to the 7th power r/sec (in excess of 10 to the 8th power r/sec using 10 Mev electrons), and neutron sensitivity for fast and thermal neutrons were measured. Energy discriminatory shields and thermal neutron attenuation shields were designed, fabricated and evaluated for each dosimetry system. (Author)

AD-429 286 Div. 25
OTS price $2.60

Brown U., Providence, R. I.
ON THE POSTULATE OF STABILITY OF MATERIAL IN THE MECHANICS OF CONTINUA,
by D. C. Drucker. Nov 63, 22p. Rept. no. TR34
Contract Nonr56220
Unclassified report

Descriptors: (*Continuum mechanics, Theory), Elasticity, Stability, Stresses, Structures, Elastic shells, Tensile properties, Deformation, Plasticity, Thermodynamics, Structural properties, Mechanics, Mathematical analysis, Materials.

The place of the postulates of stability in the small and stability in the large in the isothermal theory of mechanics of continua is described. Fully equivalent results are demonstrated for heterogeneous states of stress in a structure or any continuum, and for homogeneous states of stress either in homogeneous materials or in composite materials which are homogeneous on the macroscale. Examples are given to show that requiring too great a degree of stability leads to interesting but unacceptably strong restrictions on physical behavior. An effort is made to clarify statements of the postulate for reasonable application to time-independent and to time-dependent materials. Also, materials which exhibit changes of elastic moduli with plastic deformation and materials undergoing large strain are treated briefly. (Author)

AD-429 287 Div. 25
OTS price $2.60

Brown U., Providence, R. I.
A RAPID METHOD FOR ESTIMATING THE GREATEST STRESS IN A STRUCTURE SUBJECT TO CREEP,
by C. R. Calladine. Nov 63, 22p. Rept. no. TR35
Contract Nonr56220
Unclassified report

Descriptors: (*Structures, Stresses), Creep, Elasticity, Plasticity, Mechanics, Thermodynamics, Topology, Structural shells, Sheets, Special functions.

Several simple structures made of material in which the creep strain rate is proportional to the nth power of stress are studied with a view to determining the way in which the greatest stress in a structure varies with the exponent n when the geometry of the structure and the load carried by the structure remain unchanged. From a study of the results a simple empirical linear rule for interpolating for greatest stress between the specially simple cases n equals 1 and n approaches infinity (which correspond to exact analogs of linear elastic and perfectly plastic material respectively) is devised. The rule tends to be more conservative as n increases. The interpolation rule may be improved if a special linear-elastic thermal stress problem is solved. (Author)

AD-429 300 Div. 25
OTS price $10.50

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
EFFECTS OF SAMPLE INERTIA, ELASTICITY OF TEST

APPARATUS AND INTERNAL HEAT GENERATION IN THE TENSILE STRESS RELAXATION EXPERIMENT,
by James H. Thacher. Dec 63, 132p. Rept. no. X106
Contract NOrd16640
Unclassified report

Descriptors: (*Tensile properties, Relaxation time), (*Stresses, Tensile properties), Elasticity, Heat, Transformations (Mathematics), Analysis, Mathematical models, Stresses, Materials, Theory, Viscoelasticity, Propagation, Strain (Mechanics).

The tensile stress relaxation test is widely used to measure the mechanical properties of viscoelastic materials. For certain combinations of test conditions and materials, results from this test will be influenced by sample inertia, test apparatus elasticity, and/or internal heat generation. In this investigation the magnitude of these effects are estimated and the test conditions under which they become important are specified. Theoretical solutions for a two-parameter Maxwell material are obtained by the Laplace transform method. Solutions for a real material are formulated using the Fourier transform approach and various methods of inverting the transform are outlined. (Author)

AD-429 320 Div. 25
OTS price $4.60

Research Inst., Chicago, Ill.
SPECIAL REPORT ON AN INTEGRATING SPHERE LIGHT SOURCE,
by M. R. Weiner, D. A. Pontarelli, H. T. Betz, W. J. Davis and P. F. Fenlon. Mar 63, 35p. Rept. no. E158 47
Contract NOrd16969
Unclassified report

Descriptors: (*Light, Sources), (*Sources, Spheres), Intensity, Surface properties, Measurement, Emissivity, Design, Diffusion, Reflection, Paints, Illumination, Goniometers, Experimental data, Tables, Water, Brightness.

Work performed at Armour Research Foundation to develop a light source having a uniform Lambertian surface. A uniform Lambertian surface has these two important properties: (1) the intensity of the light emitted by a point on the surface is equal for all points on the surface, and (2) the intensity of light emitted from an infinitesimal area in a particular direction varies as cos theta, where theta is the angle between the normal to the emitting surface and the direction of measurement. The preliminary systems investigated, which did not satisfy the design requirements, are described. On the basis of this investigation it was concluded that the utilization of an integrating sphere system offered the most feasible approach to this task. The characteristics of the final integrating sphere system are described in detail. This system has several modes of operation. Uniformity and goniometric measurements were performed to determine the characteristics for the various system arrangements. This data is presented in graphical and tabular form. (Author)

AD-429 325 Div. 25
OTS price $9.10

Massachusetts Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 51,
by J. C. Slater, J. H. Wood, E. R. Keown and J. P. Dahl. 15 Jan 64, 101p.
Contracts Nonr184134, AF19 628 356
Unclassified report

Descriptors: (*Solid state physics, Crystal structure), Molecular structure, Crystal lattices, Symmetry (Crystallography), Electrons, Motion, Atoms.

AD-429 336 Div. 25, 6
OTS price $4.60

Navy Mine Defense Lab., Panama City, Fla.
THEORETICAL AND EXPERIMENTAL PROPAGATION OF ELASTIC WAVES IN A FLUID-SOLID-SOLID LAYERED SYSTEM.
Interim rept., 1 Feb-7 Sep 63,
by F. R. Spitznogle, V. C. Nelson and E. G. McLeroy. Dec 63, 37p.
Proj. SR011 01 01, Task 2612
NMDL 149 Unclassified report

Descriptors: (*Mechanical waves, Elasticity), (*Elasticity, Propagation), (*Propagation, Theory), Experimental data, Pressure, Sound, Fluids, Computers, Functions, Time, Model tests, Water, Surface properties, Reflection, Low frequency.

Theoretical expressions derived previously describing the exact pressure field produced at close ranges by an impulsive sound source in a fluid near a two-layer solid interface are evaluated by computer techniques to obtain the pressure as a function of time. Waveforms obtained experimentally from models are presented that substantiate the theoretical results. The above theory is also extended so that water surface reflections are allowed. This investigation may be of assistance in the study of low-frequency sound propagation near the ocean floor. (Author)

AD-429 341 Div. 25
OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
A MEANS OF AIMING A LASER BEAM,
by L. W. Nichols. Jan 64, 4p.
NOTS TP3446; NAVWEPS 8481 Unclassified report

Descriptors: (*Lasers, Beams (Electromagnetic)), Optical equipment, Reflectors, Telescopes.

The retrodirective reflecting properties of a corner reflector can be used to aim a laser beam. When portions of a corner reflector are placed in front of a laser and its aiming telescope, then an image of the laser beam is superimposed on the telescope image to show the exact target area being illuminated by the beam. (Author)

26. PRODUCTION AND MANAGEMENT

AD-427 997 Div. 26, 17
OTS price $2.50

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING OF REFRACTORY METALS AND ALLOYS WITH POWER-FORCE PROGRAMMING.
Final rept.,
by Nicholas Maropis and John G. Thomas. Dec 63, 1v. Rept. no. RR63 66
Contract NOw63 0125c
Unclassified report

Descriptors: (*Ultrasonic radiation, Welding), (*Welding, Refractory metals and alloys), Molybdenum alloys, Titanium alloys, Niobium alloys, Vanadium alloys, Zirconium alloys, Tungsten, Sheets, Aluminum alloys, Stainless steel, Nickel alloys, Mechanical properties, Time, Pressure, Hydrostatic pressure, Power.

Equipment was assembled for ultrasonic welding with power-force programming, to provide incremental changes in ultrasonic power and clamping force during a single weld interval. Preliminary welding of 2024-T3 aluminum alloy and Inconel X-750 showed significant weld strength improvement with power-force programming, which was selected without extensive experimentation. Significantly improved weld strengths and lower strength variability were obtained with power-force programmed welding of 0.010-in. and 0.013-in. molybdenum-0.5% titanium alloy and with 0.015-in. B-66 niobium alloy. (Author)

AD-428 011 Div. 26, 17
OTS price $4.60

Super-Temp Corp., Santa Fe Springs, Calif.
A COMPARATIVE EVALUATION OF THE FORMABILITY OF TUNGSTEN PLATE AND SHEET BY SPINNING TECHNIQUES.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by D. W. Bauer and J. R. Armstrong. 15 Jan 64, 1v.
Contract NOw63 0542c
Unclassified report

Descriptors: (*Tungsten, Metal spinning), (*Metal plates, Tungsten), (*Sheets, Tungsten), (*Metal spinning, Tungsten), Material forming, Thickness, Metallography, Hardness, Density, Powder metals, Powder metallurgy, Microstructure, Grain structures (Metallurgy).

All tungsten materials have been received, inspected, and found acceptable. Primary fabrication data, as furnished by the materials supplier, and the shear spinnability evaluation of sheet materials are reported. (Author)

AD-428 044 Div. 26, 13
OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
DEVELOPMENT OF THE B-D BLAST-CLOSURE VALVE,
by J. J. Bayles. 16 Dec 63, 16p.
NCEL N546 Unclassified report

Descriptors: (*Ventilation duct, Valves), (*Valves, Design), (*Air conditioning equipment, Control system), Blast, Pressure gages, Test methods, Effectiveness, Plastics, Air intake filters, Costs.

The Bayles-Denny Valve was designed as a low cost blast-actuated closure device for shelter air system openings. It uses an arrangement of pressure plates and compressible plastic foam to close off the air pipe when struck by a pressure wave. Several experimental combinations of plates and plastic were tested for air flow and filtration characteristics for normal ventilating use and for blast closure effectiveness. The tests indicated that the valve performance varied greatly with changes in the pore size of the plastic media. Small-pore media restricted the air flow excessively. Large-pore media gave a more useful degree of filtration and better air flow characteristics, but decreased the blast wave attenuation. All configurations reduced the shock wave to a gradual pressure rise. (Author)

AD-428 150 Div. 26, 17
OTS price $3.50

Martin Marietta Corp., Baltimore, Md.
MANUFACTURING METHODS AND DESIGN PROCEDURES OF BRAZED REFRACTORY METAL HONEYCOMB SANDWICH PANELS,
Final technical documentary rept., 20 Nov 61-20 Sept 63,
by J. W. McCown, C. R. Wilks, L. J. Gagola, A. Norton and M. Schwartz. Nov 63, 149p.
Contract AF33 657 7276, Proj. 7937
ASD TDR63 767 Unclassified report

Report on "Manufacturing Methods for Brazed Refractory Metal Honeycomb Sandwich Panels."

Descriptors: (*Sandwich panels, Design), (*Manufacturing methods, Sandwich panels), (*Refractory metals & alloys, Brazing), (*Sandwich construction, Honeycomb cores), Molybdenum alloys, Titanium alloys, Zirconium alloys, Carbon alloys, Niobium alloys, Sheets, Welding, Aerospace craft, Heat shields, Structural parts, Refractory coatings, Silicides, Thermal joining.

Manufacturing methods and design procedures were developed for fabricating details and vacuum brazing of TZM (Mo-0.5Ti-0.07Zr) molybdenum and D-36 (Nb-10Ti-5Zr) niobium alloy honeycomb sandwich panels. These included the marforming of thin sheet, the welding and finishing of honeycomb core and the high temperature vacuum brazing of honeycomb sandwich panels. Panels simulating a heat shield and a structural application on aerospace vehicles were designed, fabricated and tested at temperatures up to 2600 F. The capability of fabricating, coating and utilizing brazed niobium sandwich panels on aerospace vehicles, with the required design procedures for application at temperatures up to 2400 F, was demonstrated. Only partial success was achieved with the TZM molybdenum alloy. (Author)

AD-428 307 Div. 26, 17
OTS price $2.60

Northrop Corp., Hawthorne, Calif.
RESEARCH ON TANTALUM AND MOLYBDEMUM BRAZING TECHNIQUES,
by A. H. Freedman and E. B. Mikus. Oct 63, 35p.
Rept. no. NOR63 178
Contract AF33 657 11227, Proj. 7351, Task 735102
Unclassified report

Descriptors: (*Molybdenum alloys, Brazing), (*Tantalum alloys, Brazing), Honeycomb cores, Sandwich construction, Silver solders, Titanium alloys, Tungsten alloys, Zirconium alloys, Heat shields, Protective treatments, Foils, Microstructure, Recrystallization, Brittleness, High temperature research, Oxidation, Coatings, Reviews, Phase studies, Reentry vehicles.

Brazed molybdenum and tantalum alloy honeycomb structures offer good potential for structural

and heat shield applications in the 2500 - 3500F range. However, molybdenum is seriously embrittled at braze temperatures above approximately 2500F. Tantalum alloys are not embrittled by high braze temperatures, but there are serious production problems associated with braze temperatures above 3000F. The purpose of this program is to develop molybdenum and tantalum braze systems which braze at relatively low temperatures, but develop high remelt temperatures. Some attention is also being directed to the development of braze alloys for tantalum that braze several hundred degrees above the expected service temperature. Most of the effort will be based on the TZM molybdenum alloy and the Ta-10W alloy. Some work will be performed using the Ta-8W-2Hf and Ta-30Cb-7.5V alloys. (Author)

AD-428 197 Div. 26, 17
OTS price $1.60

IIT Research Inst., Chicago, Ill.
IMPROVED PRODUCTION OF POWDER METALLURGY ITEMS.
Interim technical documentary progress rept. no. 6, 1 Oct-31 Dec 63,
by K. Farrell and N. M. Parikh. 31 Dec 63, 17p.
Rept. RI B247 18
Contract AF33 657 9140, Proj. 7 911
ASD TDR7 911, vol. 6 Unclassified report

Descriptors: (*Powder metallurgy, Material forming), (*Powder alloys, Production), Nickel alloys, Chromium alloys, Cobalt alloys, Sintering, Forging, Particle size, High temperature research, Hot working, Heat treatment, Tensile properties, Microstructure, Hardness, Molybdenum alloys, Titanium alloys, Zirconium alloys, Carbon alloys.

The difficulties encountered in upscaling production of atomized superalloy powders from a laboratory scale to commercial quantities are outlined. Ways of overcoming the difficulties are described. Tests on sintered powder billets of Udimet 700 and Inco 713C alloys show that the billets can be readily forged. The mechanical properties of the forged Udimet 700 powder compact compare very favorably with those of the conventional wrought product. The mechanical strengths of Inco 713C alloy, which is usually considered unforgeable, are found to be twice as high as those of the conventional cast material. (Author)

AD-428 480 Div. 26, 13
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
PERFORMANCE TESTS OF THE PUMP, DRIVE MOTOR, AND SPEED CONTROLS FOR THE LABORATORY 8-INCH HIGH-HEAD TEST FACILITIES -- HYDRAULICS BRANCH, DENVER
comp. by W. P. Simmons. 31 Oct 63, 12p.
BR D LR HYD522 Unclassified report

Descriptors: (*Hydraulic pressure pumps, Performance (Engineering)), Instrumentation, Electric motors, Speed regulators, Power supplies, Test facilities, Effectiveness, Centrifugal pumps.

The minimum design requirement of 1,800 gallons per minute at a 400-foot head with a pump speed of 1,800 rpm was easily exceeded. The pump capacity at the rated speed was found to be 1,997 gallons per minute at the 400-foot head. The overall efficiency, based on total electrical input to the power supply and the water horsepower output of the pump, was 68.5 percent. This exceeds the 68.0% requirement of the specifications. The speed regulation at any constant pump load setting was within plus or minus 3 rpm of the set speed. Changes in electrical load produced by turning on and turning off other large motors in the building did not affect the speed control. A speed deviation not to exceed plus or minus 13.5 rpm was required. The speed control selector was simple to operate, stable, and sufficiently sensitive to permit speed changes as small as 3 or 4 rpm. The pump discharge was relatively steady and no difficulty was encountered in measuring the rates of flow. The motor and pump operated smoothly and almost vibrationlessly. The noise level near the 250-horsepower drive motor was higher than desirable, but not excessive. (Author)

AD-428 496 Div. 26, 12
OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THE DEPENDABILITY OF REPAIRABLE SYSTEMS WITH SOME COMMENTS ON A STRICTLY PERIODICALLY CHECKED SYSTEM,
by A. J. Monroe. 24 Jan 64, 15p. Rept. no. 6101 8327RU000
Contract AF04 694 3
BSD TDR63 251 Unclassified report

Descriptors: (*Reliability, Guided missiles), (*Checkout procedures), (*Maintainability), Equations, Operations research, Time, Maintenance, Logistics, Probability, Mathematical models.

The availability of systems which are periodically checked on a calendar basis is regarded as a random variable in terms of the number of cycles of observation of the systems. The variability of availability, defined as dependability, is calculated for one, two, and three cycles of observation for an explicit set of system parameters. (Author)

AD-428 521 Div. 26, 31
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
THE TMB 40,000-POUND, THREE-MASS VIBRATION GENERATOR, ITS DESCRIPTION AND OPERATION,
by Richard L. Price. Nov 63, 25p.
Proj. SF013 11 01
DIMB 1771 Unclassified report

Descriptors: (*Vibrators (Mechanical), Instruction manuals), (*Instruction manuals, Vibrators (Mechanical)), (*Ship hulls, Vibrators (Mechanical)), (*Structures, Vibrators (Mechanical)), Electric motors, Weight, Variable speed drives, Lubrication, Maintenance.

The 40,000-lb, three-mass vibration generator is designed to excite vibrations in large structures. Forces up to 40,000 lb in any direction perpendicular to the axis of rotation and moments up to 120,000 ft-lb can be generated over a frequency range from 0.6 to 20 cps. This report describes the mechanical and electrical parts of the generator and the principle of operation. Forces and moments are varied by adjusting the eccentricity of three rotating masses and changing the speed of rotation. A special adapter indicates the instant of applied peak force or moment. The force and moment output of the vibration generator is large enough to excite ship hull frequencies. It is, therefore, a useful tool for the determination of hull natural frequencies, mode shapes, hull damping, and impedances. It can also be used for vibration surveys of any large structure such as radar mounts and foundations. (Author)

AD-428 548 Div. 26
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ALL-UNION CONFERENCE ON ULTRASOUND,
by V. M. Patskevich. 25 Oct 63, 9p.
FTD MT63 106 Unclassified report

Trans. from Khimicheskaya Promyshlennost', No. 1, pp. 72-73, 1961.

Descriptors: (*Ultrasonic radiation, Industrial plants), (*Industries, Ultrasonic radiation), Symposia, Industrial production, Machines, Metallurgy, Plastics, Chemical reactions, Processing, Manufacturing methods, Production, Chemical industry, Metallurgy.

An All-Union Scientific-Technical Conference on the application of ultrasound in industry took place on 22-26 November 1960 in Moscow. The four main topics were: The state and trend of the development of the technological application of ultrasound in machine building, The problem of the industrial use of ultrasound in chemical-technological processes, The main problems in the area of production of sources of ultrasonic energy, and The development of methods and means of control based on the use of ultrasound.

AD-428 629 Div. 26
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CENTRIFUGAL PUMPS,
by V. I. Kiselev. 10 Oct 63, 5p.
FTD TT63 940 Unclassified report

Trans. from Nasosyi Kompressor Ventilyatory, Moscow, pp. 144, 145 and 171, 1959.

Descriptors: (*Centrifugal pumps, Theory), Pressure, Diffusers, Physical properties.

AD-428 644 Div. 26, 30, 15
OTS price $10.10

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
THE APPLICATION OF A THEORY OF MULTI-LEVEL SYSTEMS TO OPTIMIZATION PROBLEMS,
by Jerry L. Sanders. Feb 63, 119P. Rept. no. SRC24A63 12
Contracts Nonr114109, Nonr 114112
Unclassified report

Descriptors: (*Optimization, Control systems), Programming (Computers), Operations research, Economics.

An attempt is made to simultaneously develop certain aspects of a theory of multi-level systems and decomposition techniques for multivariable optimization problems. Two level-three goal systems are explored intensively with particular reference to the method of ''coordination'' employed by the second level unit. ''Direct'' and ''Indirect Intervention'' modes are explored. The problem of the quantity of information required by the second level for the coordination of the first level systems is investigated. ''Direct'' and ''Indirect Model'' are investigated. The concept of the ''Indirect Model'' leads to the development of a Decomposition Principle for Non-Linear Programming. The concluding chapter presents the analysis of a numerical example coded for the computer which demonstrates the utility of certain of the techniques in the context of a specific application. (Author)

AD-428 673 Div. 26, 15, 30
OTS price $14.00

Battelle Memorial Inst., Columbus, Ohio.
FORMULATION OF SYSTEM STATUS CONTROL TECHNIQUES.
Rept. for Oct 62-Sep 63.
Sep 63, 191p.
Contract AF33 616 7761, Proj. 8119, Task 811922
ASD TDR63 792
Unclassified report

Descriptors: (*Control systems, Reliability), Operations research, Probability, Nonlinear systems, Stochastic processes, Difference equations, Programming (Computers), Equations.

Techniques for the measurement and predictions of future system performance are described. Failure prediction using these techniques is then accomplished based on the assignment of tolerance limits to appropriate performance characteristics. The techniques developed in this report can be classified into two parts: (1) statistical failure prediction models of general applicability, and (2) measurement and prediction techniques for specific classes of systems taking into account those properties peculiar to the class. In the first part, techniques are derived for systems which are continuously monitored, and for systems checked periodically. In the second part, feedback, adaptive, and redundant systems are considered. The techniques are designed to be programmed into automatic checkout equipment. Sample flow charts are given in some cases. Finally, plans for validating these techniques in application to specified hardware systems are described.

AD-428 790 Div. 26
OTS price $16.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGH PRODUCTIVITY TOOLS AND EQUIPMENT (Vysokoproizvoditel'naya Tekhnologicheskaya Osnastka), ed by S. L. Martens. 12 Dec 63, 239p.
FTD TT62 1359 Unclassified report

Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashninostroitel'noy Literatury, pp. 1-176, 1960.

Descriptors: (*Machine tools, Standardization), (*Industrial equipment, Machine tools), Economics, Cutting tools, Industrial production, Manufacturing methods, Forging, Welding, Reinforced concrete, Non-metals.

Contents: Technico-economical basis for the utilization of technological equipment, The economical effectiveness of standardization of production tooling in machine building, Basic trends in the standardization of technological equipment, Modern machine-tool fixtures for series and short-run production, Knockup-knockdown machine-tool fixtures for serial production, Experience gained in the use of universal prefabricated fixtures in pilot and series production, Pneumatic clamping devices for universal knockup fixtures, The standardization trend in machine-building technology, Experience acquired in introduction of element-by-element forging in pilot and small-series production, Universal technological tooling equipment for pilot and unit production, Utilization of nonmetallic materials in machine-tool equipment, Standardization of fixtures for welding and assembly operations, Utilization of reinforced concrete in the fabrication of assembly fixture frames, Standardization of metalcutting and auxiliary tools.

Division 26 - PRODUCTION AND MANAGEMENT

AD-428 857 Div. 26, 15
OTS price $9.60

Massachusetts Inst. of Tech., Cambridge.
SCHEDULING INDEPENDENT TASKS ON ONE OR MORE PROCESSORS,
by Michael H. Rothkopf. Jan 64, 110p. Technical rept. no. 2
Contract Nonr1841 87
Unclassified report

Report on Research in the Control of Complex Systems.

Descriptors: (*Scheduling, Optimization), Queueing theory, Programming (Computers), Economics, Operations research, Stochastic processes, Sequential analysis.

The problem concerns the scheduling m independent, immediately available tasks on n processors. Each task has a service time and a waiting cost rate that is a function of time. There are no feasibility restrictions on the order in which the tasks are to be processed. The problem is related to the job shop scheduling problem and the problem of optimally assigning priorities in a queueing system. It is shown that when the cost rate is equal to the linear waiting costs with continuous discounting rate and there is a single processor, waiting costs are minimized by sequencing the tasks in decreasing order. A dynamic programming algorithm has been developed for a wide class of multiprocessor scheduling problems. Linear waiting costs (with or without discounting), arbitrary processor use costs, and certain other costs are considered. In certain cases, the service time of a task may be a function of the processor that performs it. Several algorithms are presented for scheduling tasks with absolute deadlines on one or more processors. For certain classes of problems, the unprofitability of splitting tasks in time or between processors is proved. Scheduling when service times and cost rates are known only stochastically is discussed. (Author)

AD-429 101 Div. 26, 16, 17, 4
OTS price $12.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BERYLLIUM TOXICOLOGY, SYMPTOMATOLOGY OF AFFECTIONS AND INDUSTRIAL HYGIENE (Berilliy Toksikologiya, Kilinika Porazheniv, Gigiyena Truda),
by V. M. Kozlov and V. D. Turovskiy. 24 Oct 63, 159p.
FTD TT63 578 Unclassified report

Trans from Gosudarstvennoye Izdatel'stvo Literatury V Oblasti Atomnoy Nauki i Tekhniki, pp. 3-118, 1962.

Descriptors: (*Beryllium, Toxicology), Industrial medicine, Pathology, Biochemistry, Chemical properties, Beryllium compounds, Production, Fluorescence, Blood, Hematology, Tissue (Biology), Lungs, Gastrointestinal system, Respiratory system, Diagnosis, Contamination, Test facilities, Test methods, Aerosols, Determination, Ventilation, Filters (Fluids), Beryllium alloys.

Problems are described of the toxicology of beryllium, the symptomatology of affections caused by the action of this compound, industrial hygiene for beryllium production, and the protection of the environment from contamination with production wastes. The authors have worked out sanitary-hygienic requirements for the designing of production areas, for the various types of equipment used, and for industrial ventilation systems. The sanitary-hygienic requirements described apply primarily to the production of beryllium and components fabricated from this metal and to enterprises or shops which produce beryllium-rich alloys of other metals. These requirements cannot be completely extended to the production processes by which alloys containing only small quantities of beryllium are obtained and to work associated with the fabrication of components from such alloys. (Author)

AD-429 103 Div. 26, 19
OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PRODUCTION TECHNOLOGY OF MINIATURE GYROMOTORS (Tekhnologiya izgotovleniya malogabaritnyke giromotorov),
by S. A. Zholdak. 15 Jan 64, 357p.
FTD TT62 859 Unclassified report

Trans. from Gosudarstvennoye Soyuznoye Izdatel'stvo Sudostroitel'noy Promyshlennosti, pp. 1-267, 1961.

Descriptors: (*Gyroscopes, Electric motors), (*Electric motors, Design), Production, Ball bearings, Casting, Machining, Finishes & finishing, Specifications, Manufacturing methods, Structural parts, Coils, Materials, Coatings, Configuration, Corrosion inhibition, Vibration, Lubricants, Tests, Checkout procedures, Temperature, Miniature electrical equipment.

This volume considers problems of the production technology of components and units and also the assembly and testing of one of the basic elements of any gyroscopic instrument - the gyromotor. The principal attention is devoted to the technology of the miniature electric gyromotor. Devices used to insure high manufacturing precision are described. The material of the book is arranged in the sequence in which the components are usually finished and the units assembled in the production of gyromotors. (Author)

AD-429 115 Div. 26, 17
OTS price $9.10

Westinghouse Electric Corp., Blairsville, Pa.
THE EXTRUSION, FORGING, ROLLING, AND EVALUATION OF REFRACTORY ALLOYS.
Rept. for 1 Aug 62-31 May 63,
by G. A. Reimann, D. R. Carnahan, and J. A. Visconti. Dec 63, 99p.
Contract AF33 616 8325, Proj. 7351, Tasks 735101, 735105
ASD TDR62 670, pt. 2 Unclassified report

Descriptors: (*Refractory metals and alloys, Material forming), (*Material forming, Tungsten alloys), Molybdenum alloys, Niobium alloys, Extrusion, Forging, Rolling (Metallurgy), Tensile properties, Hardness, Microstructure, Grain structures (Metallurgy), Processing.

Wrought bars of tungsten-base alloys were produced by extrusion of arc-cast billets under a variety of conditions. Billets of W+0.6Cb alloy were successfully extruded using temperatures between 3200 and 4200 F and reduction ratios between 3.9:1 and 8.3:1. A comparison was drawn between W+0.6Cb extrusions produced from material melted by four suppliers. Differences in material characteristics could be traced to electrode suppliers. The W-6Mo+2Cb alloy was extruded between 3400 and 4200 F using ratios from 4.1:1 to 7.4:1. Surfaces were generally fair to poor and internal cracks were discovered in many extrusions. Machining billets from 4-inch ingots instead of 3 1/2-in. ingots produced only a slight improvement in extrusion quality. (Author)

AD-429 175 Div. 26, 30, 18
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
SOME CONSIDERATIONS ON PARTS, MATERIALS AND PROCESS ENGINEERING FOR MILITARY SYSTEMS, by Douglas O. Heitkamp. 23 Jan 64, 20p.
Rept. no. TDR269 4303 9
Contract AF04 695 269
SSD TDR64 3 Unclassified report

Descriptors: (*Specifications, Reliability) (*Military requirements, Quality control), Production, Manufacturing methods, Military engineering, Procurement, Processing, Material control, Management engineering.

Every military system can be subdivided into subsystem, equipments, assemblies and components. These, in turn, can be reduced to their basic constituents, that is, parts and materials. It logically follows that parts and materials in conjunction with manufacturing processes constitute the elements basic to the creation of any system. Therefore, if any defects or deficiencies exist in the parts, materials, and processes being used to create a system, it should come as no surprise that the system will exhibit undesirable characteristics relative to performance, reliability, maintainability, effectiveness, producibility, supportability, and availability; the program may require excessive funds and undergo schedule slippages during design and development of the system. This paper will attempt to describe certain experiences relative to parts, materials, and processes technology with a view toward developing recommendations that can be useful to SSD and the Aerospace Corporation. Certain implications of these recommendations on SSD and Aerospace technical management responsibilities will also be discussed. (Author)

AD-429 204 Div. 26, 8, 12
OTS price $5.60

Sylvania Electric Products, Inc., Walthan, Mass.
PLAN FOR PRODUCTION ENVIRONMENTAL TESTING OF THE GROUND ELECTRONICS SYSTEM (PRODUCTION PROGRAM), by L. McGonigle. 20 Jan 64, 25p. Rept. no. MPO PD0015, rev. 2
Contract AF04 694 261
Unclassified report

Supersedes MPO PD0015.

Descriptors: (*Ground support equipment, Environmental tests), Production, Guided missiles (Surface-to-surface). Test equipment (Electronics). Tests, Electronic equipment, Military requirements, Vibration.

Efforts were directed to define the Production Environmental Tests (PET) that will be performed on Sylvania responsible GES equipments constructed under the VAFB and WING VI contracts. Production Environemntal Testing is the operation of equipment in a non-destructive, non-deleterious environment, within environmental design limits. The objectives of Production Environmental Testing are: (1) To isolate and eliminate latent manufacturing defects and workmanship errors not detectable by other inspection or test techniques; (2) Eliminate infant mortality failures by operation of the equipment; (3) Serve as one of the equipment acceptance tests. (Author)

27. PROPULSION SYSTEMS

AD-427 964 Div. 27, 12
OTS price $8.10

Naval Ordnance Test Station, China Lake, Calif.
FEASIBILITY DEVELOPMENT OF VARIABLE DEMAND LIQUID PROPELLANT GAS GENERATOR,
by Daniel Meraz, Jr. Sep 63, 86p.
NOTS TP3234; NAVWEPS 8352
Unclassified report

Descriptors: (*Gas generating systems, Liquid rocket propellants), (*Rocket motors, Gas generating systems), Design, Nitric acids, Hydrazine derivatives, Theory, Temperature, Performance (Engineering), Fuel injectors, Booster motors, Combustion chambers, Valves, Tables, Captive tests, Ignition, Combustion, Servomechanisms, Control systems, Pressure gages, Feasibility studies.

Theoretical and experimental studies were made to determine the feasibility of using a variable-demand liquid-propellant gas generator for pressurization of propellant tanks. Operating principles and test results of two self-regulating variable-demand gas generators are presented. Red fuming nitric acid was successfully expelled by direct pressurization from a propellant tank at variable flow rates while maintaining a constant tank pressure. The results showed that a variable-demand liquid-bipropellant gas generator is feasible for a prepacked pressurization system. (Author)

AD-428 075 Div. 27, 10, 9, 25
OTS price $4.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TASK R.
Quarterly progress rept. no. 19, 1 Oct-31 Dec 63. 31 Dec 63, 23 p. Rept. no. SR4 3
Contract NOw62 0604c
Unclassified report

Descriptors: (*Gas flow, Dissociation), (*Nozzle gas flow, Gas analysis), Electrons, Spin, Tests, Test methods, Nitrogen compounds, Dioxides, Peroxides, Chemical equilibrium, Test equipment, Oxygen, Fluid flow, Volumetric analysis, Theory, Atoms, Molecular beams, Reaction kinetics, Nozzles, Porous materials, Rocket motor nozzles, Fluid dynamics, Heat transfer, Nozzle gas flow, Infrared spectroscopy, Rocket motors, Captive tests, Infrared detectors, Nuclear spins, Nuclear resonance.

Dissociated gas studies are presented. Experimental proof of the quantitative reliability of electron spin radiance (ESR) determination of O and N concentrations using O(2) as a reference calibrating gas is summarized by comparing with NO(2) and NO titration results. This phase of the work is now complete. Also molecular beam chemical kinetic studies are reported. A prototype aerodynamic beam apparatus is described which uses a porous wall nozzle. Preliminary tests are discussed. Rocket Nozzle Fluid Dynamics are reported. Additional infrared spectrometer tests in the rocket nozzle with ARP propellant are described. A new calibration cell suitable for high pressures and temperatures is being built. (Author)

AD-428 102 Div. 27, 12
OTS price $4.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
ARDE-PORTLAND LITHIUM COOLED NOZZLE PROGRAM.
Final rept.
by Ronald G. Eyestone and Robert C. Hamlett.
Dec 63, 43p.
AMC RA RT TR63 13 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Rocket motor nozzles), (*Rocket motor nozzles, Liquid cooled), Liquid metals, Lithium, Captive tests, Film cooling, Thermocouples, Instrumentation, Pressure, Temperature, Time, Failure (Mechanics), Tests, Damage.

A series of tests were conducted to determine the feasibility of cooling a solid propellant motor nozzle using liquid lithium as a cooling agent. Damage to the cooled nozzle was so severe that no concrete conclusions could be drawn from this test program. (Author)

AD-428 104 Div. 27, 17
OTS price $11.00

Rocketdyne, Canoga Park, Calif.
ADVANCED TECHNOLOGY FOR PROPULSION SYSTEMS, REFRACTORY MATERIALS.
Final rept.,
by J. W. Robinson. 15 Dec 61, 1v. Rept. no. R3350 3
Contract NOw60 0445c
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Refractory materials), (*Refractory materials, Mechanical properties), Graphite, Processing, Physical properties, Processing, Refractory metals & alloys, Tungsten, Thermal conductivity, Rhenium, Tantalum, Osmium, Molybdenum, Niobium, Iridium, Ruthenium, Hafnium, Manufacturing methods, Vanadium, Chromium, Zirconium, Thorium, Platinum, Titanium, Palladium, Beryllium, Uranium, Aluminum, Carbides, Nitrides, Borides, Silicides, Hardness.

The following refractory materials and metals are reported; refractory carbides, refractory borides, refractory silicides, intermetallics, graphite. Also reported are conversion units for commonly used properties, high temperature properties, material producers and fabricators, and fabrication techniques.. (Author)

AD-428 116 Div. 27
OTS price $6.60

Aeronutronic, Newport Beach, Calif.
INTERNAL ENVIRONMENT OF SOLID ROCKET NOZZLES.
Quarterly technical rept. no. 2, 1 Sep-30 Nov 63,
by F. C. Price, W. C. Kuby, R. A. Dobbins and V. A. Marple. 19 Dec 63, 57p. Pub. no. U2414
Contract AF04 611 9072
RTD TDR63 1075 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Rocket motor nozzles), (*Rocket motor nozzles, Heat transfer), Particles, Canted nozzles, Pressure, Theory, Aluminum compounds, Oxides, Thermal radiation, Hydrogen, Oxygen, Optical properties, Scattering, Exhaust gases, Measurement, Captive tests, Slurry fuels, Emissivity, Tests, Water, Molybdenum, Gas flow, Combustion, Nozzle gas flow, Condensation, Thermal insulation.

A study was conducted of solid propellant rocket motor nozzle environment to implement nozzle design methods. Cold flow studies with models plus hot firing tests for particle impingement and particle cloud radiation are to be used to characterize heat flux rates throughout the

nozzle. This report describes the hardware buildup and schedule of heat flux tests on a molybdenum nozzle with hydrogen, oxygen, water, and varying amounts of alumina. Cold flow technique development has shown interesting particle impingement effects as a function of modeling system design and nozzle shape. The implied full scale particle impingement rates are listed for the first two cases studied. A complete report is given on a program studying radiation of a hydrogen-oxygen-alumina plume from a one-inch diameter throatless engine. High emissivity values are indicated for all but the smallest engines. (Author)

AD-428 168 Div. 27, 17
OTS price $7.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
FEASIBILITY DEMONSTRATION OF A TRANSPIRATION COOLED NOZZLE SYSTEM.
Interim rept. no. 2, 15 Sep-14 Dec 63.
14 Dec 63, 67p. Rept. no. ER5209Q2
Contract AF04 611 9071, Proj. 3059, Tasks 305907, 305913
RTD TDR63 1074 Unclassified report

Descriptors: (*Rocket motor nozzles, Sweat cooling), Feasibility studies, Refractory materials, Porosity, Sintering, Tungsten, Permeability, Nitrogen, Nozzle inserts, Thermal expansion, Tensile properties, Temperature, Silver, Brazing, Joints, Tantalum, Welding, Configuration, Stresses, Tests, Test equipment, Cooling, Coolants, Fluid flow, Thermal stresses, Microstructure, Metallurgy.

Transpination cooled rocket nozzle system studies are presented. Bench tests were conducted to substantiate flow relationships, verify heat transfer analyses, evaluate the effect of infiltrants, and investigate particle impingement. Also, laboratory tests to determine the physical properties of porous tungsten were completed. The thermal stress analysis was refined to incorporate the Von Mises yield criterion and the effect of plastic flow and shape redistribution on the resulting stresses. The scale-up process to produce full size inserts was completed and three full size porous inserts thermal shock tested with no failures. Joining investigations were completed on brazing and welding tantalum directly to porous tungsten. As a part of this investigation, a study was initiated to determine the feasibility of welding tantalum to a dense tungsten ring which is embedded in the porous insert during the sintering process. (Author)

AD-428 437 Div. 27
OTS price $11.00

Vidya Div., Itek Corp., Palo Alto, Calif.
A STUDY OF SOLID-PROPELLANT ROCKET MOTOR EXPOSED MATERIALS BEHAVIOR.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 63,
by Peter A. McCuen, Raymond E. Lundberg and John W. Schaefer. 30 Nov 63, 1v.
Contract AF04 611 9073, Proj. 3059, Tasks 305907, 305913
RTD TDR63 1076 Unclassified report

Descriptors: (*Rocket motor (Solid propellant), Materials), (*Rocket motor nozzles, Materials), Theory, Boundary layer transition, Temperature, Reaction kinetics, Ablation, Enthalpy, Erosion, Tests, Particles, Solid rocket propellant, Graphite, Heat transfer, Hydrogen, Thermodynamics, Entropy, Gases, Mixture, Pressure, Instrumentation, Boundary layer, Nozzle inserts, Reinforcing materials, Refractory materials, Heat, Experimental data, Tables.

A study was made to characterize many of the complex individual phenomena occurring in the ablation process of solid-propellant rocket wall materials. Techniques are used to gain a better understanding of ablation phenomena under simplified conditions and to guide, to a certain extent the design of aft-closures and nozzles. Theoretical studies were conducted with materials that erode with one ''moving boundary'' such as graphite (nonablating refractories are a special case of this category), and with materials such as the reinforced plastics, or composites, whose ablation can be characterized by two moving boundaries. Experimental studies consisting of graphite and composite-nozzle ablation tests and metallic-oxide particle-impaction tests were carried out. The theoretical effort also included the following areas: convective heat transfer, thermal behavior of a nonmelting, noncharring nozzle insert, nozzle wall chemical erosion, and reaction kinetics. (Author)

AD-428 558 Div. 27
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LIFE PLUS RELIABILITY,
by A. Pugachev and N. Domotenko. 25 Oct 63, 7p.
FTD 63 108 Unclassified report

Trans. from Grazhdanskaya Aviatsiya, 20:4, pp. 16-17, 1963.

Descriptors: (*Turbopropeller jet engines, Reliability), Combustion chambers, Temperature, Turbojet exhaust nozzles, Distribution, High-temperature research, Life expectancy.

AD-428 638 Div. 27
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF ANNULAR DIFFUSORS OF MARINE-GAS-TURBINE INSTALLATIONS,
by S. F. Abramovich and L. G. Vasil'yev.
3 Dec 63, 15p.
FTD TT63 1039 Unclassified report

Trans. from Sudostroyeniye, no. 3, pp. 34-38, 1963.

Descriptors: (*Gas turbines, Diffusers), Marine engines, Effectiveness, Annular nozzles, Design, Tests, Performance (Engineering), Configuration, Equations, Nozzle inserts, Gas flow.

AD-428 728 Div. 27
OTS price $5.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
MEASUREMENT OF HEAT FLUX IN SOLID PROPELLANT ROCKETRY,
by Charles E. Brookley. Nov 63, 49p. Rept. no. ABL Z60
Contract NOrd16640
Unclassified report

Presented at Instrument Society of America, 18th Annual Conference, 9 Sep 63, Chicago, Illinois.

Descriptors: (*Rocket motors (Solid propellant), Heat transfer), (*Heat transfer, Measurement), (*Calorimeters, Design), Instrumentation, Combustion chambers, Captive tests, Combustion chamber liners, Thermal insulation, Thermal radiation, Surface tem-

perature, Radiometers, Temperature, Solid rocket propellant, Aluminum, Time, Test equipment, Gas flow, Ablation.

Internal chamber areas of solid propellant rocket motors are lined with ablative insulation to block the transfer of heat to temperature sensitive case materials. The heat rates to ablative insulators can not be determined by conventional means such as staggering thermocouples through the wall because no workable analytical solution exists for the ablative model. Therefore, it was necessary to measure the heat rates directly by mounting transducers in the ablative wall. A small 5-inch diameter rocket motor was used as the test vehicle for this study, and ablative materials were mounted in the blast tube or in the chamber (peripheral slab) area. Peripheral slabs were subjected to low velocity gas flow calculated to be 50 ft/sec; low velocity flow prevents erosion from affecting the operation of the calorimeters. Because the blast tube has an initial calculated velocity of 870 ft/sec and is therefore subject to extensive erosion, no serious attempt was made to design a heat flux gage for this area. (Author)

AD-428 863 Div. 27, 12
OTS price $5.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
TRANSPORTATION-VIBRATION TEST OF PERSHING MISSILE SYSTEM TACTICAL SHIPPING AND STORAGE CONTAINERS - PHASE II.
Final rept.,
by Ronald G. Eyestone. Dec 63, 45p.
Proj. 516 05 011
AMC RA RT TR 63 8 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Containers), (*Containers, Transportation), Vibration, Storage, Tests, Trailers, Test methods, Test facilites, Failure (Mechanics), Damage, Cargo vehicles, Booster motor, Second stage motors, Guided missiles (Surface-to-surface).

Tactical first- and second-stage shipping and storage containers for the PERSHING Missile System, with dummy loads, were subjected to the maximum vibration conditions which they may experience during truck transportation. The test was performed by transporting the containers, truck mounted, over a rough road course while varying the speed to obtain desired G levels. (Author)

AD-428 942 Div. 27, 12
OTS price $8.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
RANGE SAFETY REPORT FOR ARP SLV-1B VEHICLE.
Jan 64, 1v.
AFSWC SLV 1B RSR1A Unclassified report

Supersedes rept. SWC LSLV-1B RSR-1.

Descriptors: (*Launch vehicles (Aerospace), Trajectories), (*Space probes, Trajectories), Safety, Configuration, Rocket motors (Solid propellant), Rocket trajectories, Wind, Circular error probable, Programming (Computers), Staging, Drag, Booster motors, Fins, Failure (Mechanics), Spin, Velocity, Angle of attack, Stability, Destructors, Atmosphere entry, Ablation, Aerodynamic heating, Payload, Tracking, Separation, Tests, Guided missile ranges, Guided missile safety.

The performance characteristics of the SLV-1B vehicle, the three sigma dispersion analysis, wind effects, failure occurrences, the destruct dynamics, reentry heating, and tracking equipment. The range safety for the vehicle is included. (Author)

AD-429 013 Div. 27, 10
OTS price $1.10

British Internal Combustion Engine Research Association.
COMBUSTION IN DIESEL ENGINES.
Rept. no. 1, 1 Aug-31 Oct 63,
by D. W. Tryhorn. 27 Nov 63, 4p.
Contract DA91 591EUC2974
Unclassified report

Descriptors: (*Diesel engines, Combustion), Fuel injection, Thermodynamics, Tests, Temperature.

Effort is being made to find the effect of changes in compression temperature on combustion in an engine with a multi-hole injector nozzle (engine C). It is thought that the basic combustion system may play a big part in determining the behaviour of an engine operating with a low compression temperature. (Author)

AD-429 079 Div. 27, 1
OTS price $15.50

Lockheed Aircraft Corp., Burbank, Calif.
INLET-EXHAUST-THRUST REVERSER PROGRAM FOR THE COMMERCIAL SUPERSONIC TRANSPORT.
Final rept., 1 July 62-1 July 63,
by John L. Benson. 26 July 63, 1v. Rept. no. 16261 3
Contract AF33 657 9433
Unclassified report

Descriptors: (*Thrust reverse, Jet transport planes), (*Turbojet inlets, Supersonic characteristics), Supersonic planes, Turbojet engines, Control systems, One-dimensional flow Programming (Computers), Equations, Shock waves, Computer logic, Subsonic characteristics, Ducts, Velocity, Sound, Friction, Momentum, Air, Temperature, Flight paths, Wedges, Diffusers, Gusts, Pressure, Models simulation, Mathematical models, Commercial planes.

A comprehensive examination of various analytical methods which describe the dynamics of supersonic air induction systems was made. Based upon this examination an analytical procedure was developed, which it is believed accurately describes the steady state and dynamic behavior of fixed or variable geometry supersonic inlet systems. Transfer functions in combination with a simple lumped volume representation form the foundation of an analytical inlet model which when combined with derived models of a control system and engine can be used to predict the steady state and transient performance of an entire propulsion system package. Such representations have been developed for several propulsion systems representative of types being considered for the commercial Supersonic Transport aircraft. The engine representations used in this integrated inlet-engine system were developed under a parallel contract. (Author)

AD-429 243 Div. 27, 25
OTS price $6.60

Bolt Beranek and Newman, Inc., Cambridge, Mass.
PISTON-SLAP NOISE IN RECIPROCATING MACHINERY.
by Eric E. Ungar, Donald Ross and Franklin F. Alvarez. Jan 64, 29p. Rept. no. 1106
Contract Nobs 88480, Proj. 11125, Task 1355
Unclassified report

Descriptors: (*Pistons, Noise). (*Internal combustion engine noise, Pistons). (*Compressor noise, Pistons). Vibration, Mechanics, Impact shock, Lubricants, Sound, Velocity, Diesel engines, Dynamics, Connecting rods, Power, Naval vessels (Combatant), Theory, Bibliographies, Acoustics.

A study is made of the 'piston slap' noise concept derived from reciprocating machinery. Presented is an analysis of the mechanics of piston-slap and a theoretical basis is provided for estimating the noise and vibration levels corresponding to such piston slap impacts. A detailed analysis of piston forces and motions is presented, formulas for calculating the radiation efficiency of ribbed panels are set down, correlations of Zinchenko's diesel noise data with various engine parameters are discussed, and an annotated bibliography dealing with the mechanical noise of reciprocating machinery is also provided. (Author)

AD-429 289 Div. 27, 26
OTS price $1.60

Aerojet-General Corp., Sacramento, Calif.
INVESTIGATION OF FILAMENT-WINDING PATTERNS.
Bimonthly rept. no. 4, 24 Oct-24 Dec 63. 31 Jan 63, 6p. Rept. no. 0627I4
Contract NOw63 0627c
Unclassified report

Descriptors: (*Rocket cases, Filament wound construction), (*Filament wound construction, Geometry), Structural properties, Pressure vessels, Tests, Deformation, Combustion chambers, Experimental data, Hydrostatic pressure, Rocket motors (Solid propellant).

An investigation was made of the inter-relation between chamber winding patterns and chamber behavior. All ten chambers required for Phase I of this program were fabricated. Seven of the units were hydrostatically tested, and the data were analyzed. Evaluation of the developed analytical approach relating to deformation control of isotensoid head shapes was initiated. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-428 112 Div. 28
OTS price $3.60

Washington School of Psychiatry, D. C.
THE EFFECT OF A PARTICULAR STRESS ON ONE MAN'S PERFORMANCE OF VARIOUS TRACKING TASKS.
Interim progress rept.
by Elizabeth DeSocio, Norman K. Walker, Hamilton Mowbray and Lewis Durr. Sep 63, 1v.
Contract DA49 193MD2369
Unclassified report

In cooperation with Applied Physics Lab., Johns Hopkins Univ.

Descriptors: (*Stress (Physiology), Acuity), (*Audiometry, Stress (Physiology)), Hearing, Tracking, Job analysis, Control, Acceleration tolerance, Errors, Tables, Decision making, Effectiveness.

This is an interim progress report on a study to determine whether certain tracking tasks can be used as accurate indicators of stresses on human beings. Preliminary work showed that ''auditory shadowing'' even by a skilled subject could cause catastrophic degradation in performance of a tracking task. The present report investigates the effect for an acceleration control tracking task over a wide range of control stiffnesses (8.3 to 915.0 mils/second2) and control lag (0.0 to 1.255 seconds). The results indicate, as a working hypothesis-: (a) That the percentage increase in error due to control lag, and due to auditory shadowing is independent of control stiffness. (b) That the effect of auditory shadowing is small (40%- 50% increase in error) with no lag, but very great (over 200% increase in error) if the lag is 0.3 seconds or more. (c) That under conditions where severe degradation of the tracking task occurs, the accuracy of the auditory shadowing is also seriously degraded. (Author)

AD-428 183 Div. 28
OTS price $6.60

California U., Los Angeles.
PERFORMANCE STUDIES ON THE NOTS-UCLA TRACKING SIMULATOR: EFFECTS OF ERROR MAGNIFICATION, FIELD OF VIEW, PROPRIOCEPTIVE CUES AND CONTROL DYNAMICS,
by David R. Garfinkle, Russell L. Smith, Hilde Groth and John Lyman. Apr 63, 59p. Rept. nos. 63 41, TR20
Contract N123 60530 23558A
Unclassified report

Descriptors: (*Tracking, Training devices), (*Performance tests, Tracking), (*Human engineering, Tracking), Errors, Control, Visibility, Proprioception, Test methods, Effectiveness, Trajectories, Training, Visual acuity, Motivation.

Experiments were performed on the NOTS-UCLA Tracking Simulator to assess effects of field of view and error magnification proprioceptive cues and displacement aiding on tracking performance. Performance effects due to trajectory characteristics, trajectory direction and tracking dimension were also analyzed. Particular attention was paid to individual differences and interactions between the chosen variables. The results showed: (1) that an error magnification by a factor of five significantly decreases tracking error compared to tracking without error magnification; (2) that proprioceptive cues related to both azimuth and elevation significantly improved tracking performance; (3) that the displacement aiding control dynamics produced better tracking scores than unaided velocity control dynamics. Individual differences in performance remained fairly consistent over all experimental conditions. The better trackers were consistently superior and showed less decrement on the more difficult tasks than the poorer trackers. Other interaction effects were relatively unimportant. (Author)

AD-428 209 Div. 28
OTS price $8.10

Entelek, Inc., Newburyport, Mass.
THE LOGICAL BASIS OF TEACHING. I. THE EFFECT OF SUBCONCEPT SEQUENCE ON LEARNING.
Final rept.,
by Albert E. Hickey and John M. Newton. Jan 64, 75p.
Contract Nonr421500
Unclassified report

Descriptors: (*Training, Learning), Transfer of training, Analysis, Models (Simulation), Theory, Decision making, Transformations (Mathematics), Linear programming, Programming language, Linear systems.

This study (1) explores the structure of knowledge and the relationship between a multidimensional knowledge space and the one-dimensional teaching space, (2) offers several hypotheses for transformations from the first space to the second, (3) demonstrates the results of different hypotheses using economics as subject-matter, and (4) describes an experiment designed to see whether alternative subconcept sequences have a significant differential effect on learning. (Author)

AD-428 235 Div. 28
OTS price $1.60

Ohio State U. Research Foundation, Columbus.
FORMAL AND BEHAVIOR FACTORS IN DECISION PROCESSES.
Final rept.
by Alvin A. Scodel. 22 Nov 63, 16p. Rept. no. 808
Contract AF49 638 317, Proj. 9778
AFOSR 64 0010 Unclassified report

Descriptors: (*Behavior, Decision making), (*Decision making, Behavior), Game theory, Personality, Performance tests, Social communication, Religion.

AD-428 258 Div. 28
OTS price $15.50

Purdue U., Lafayette, Ind.
PERCEPTUAL ORGANIZATION: AN INVESTIGATION OF VISUAL AND AUDITORY SENSORY INTERACTION,
by Robert Stanley Zeigen. Jan 64, 229p.
Unclassified report

Doctoral thesis.

Descriptors: (*Audiometry, Reaction (Psychology)), (*Vision, Reaction (Psychology)), Sensory mechanisms, Stimulation, Sound, Pattern recognition, Perception, Theory, Sound pitch, Analysis of variance, Man, Women, Visual acuity, Measurement, Acuity, Tables.

The purpose of this research was to determine if multidimensional visual and auditory stimuli could be categorized along a common psychological dimension of complexity. Three studies examined this problem, using random shapes as the visual stimuli and ''tonal clusters'' (musically defined chords produced either by an organ or by pure tone

oscillators) as the auditory stimuli. As a check on the methodology using successive categories, the same stimuli were divided into two subsets and each was judged for similarity by new groups of subjects using the method of paired comparisons. Twenty-five subjects judged one subset, and 28 the other. The results by this method were generally consistent with those obtained with the method of successive categories with the exception that frequency range was found to be a more significantly confounding variable. The implications of the results for the processing of simultaneously experienced stimulation by central mediation are discussed. (Author)

AD-428 268 Div. 28
OTS price $1.60

Training Research Lab., U. of Illinois, Urbana.
CURRICULAR AND SPECIFIC TRANSFER TO PROBLEM SOLVING ABILITY,
by Carl Bereiter. Oct 63, 16p. Technical rept. no. 13
Contract ONR1834 36
Unclassified report

Descriptors: (*Aptitude tests, Measurement) (*Transfer of training, Performance tests), Training, Reasoning, Game theory, Linear programming, Effectiveness, Education, Psychometrics.

The studies summarized in this report investigate transfer from a variety of kinds of training to performance on a variety of problem-solving tasks. They cover a wide range from studies in which the training is in a well-established content area and the transfer task is radically different from, perphaps even somewhat incompatible with the tasks performed during training, to ones in which the training consists essentially of practice on parallel forms of the transfer tasks. The results of this experiment were negative for any claimed transfer effects of curricular or specific training on problem-solving ability. Considering the small and heterogeneous sample of subjects, however, it may be worth searching the results for some more direct indication of whether or not transfer effects may be obtainable. The differences between experimental groups, though slight, are almost all in a direction suggestive of positive transfer. Students who had studied logic were a little better on Attain That Concept; students who had studied game theory were better on linear programming problems; students who had studied hypothesis formation showed some advantage on it. The effects are certainly not ones to get excited about, but they should at least not stand in the way of anyone setting out to teach these abilities. (Author)

AD-428 282 Div. 28
OTS price $3.60

Human Factors Research, Inc., Los Angeles, Calif.
THE USE OF REFERENCE SIGNALS IN A VISUAL VIGILANCE TASK. II. REFERENCE SIGNALS DISPLAYED WHEN DEMANDED AND WHEN ARBITRARILY PROGRAMMED,
by C. H. Baker and J. O'Hanlon, Jr. Dec 63, 23p. Rept. no. TR750 2
Contract Nonr412000, Proj. NR196 035
Unclassified report

Descriptors: (*Visual signals, Programming (Computers)), (*Aerial reconnaissance, Performance tests), (*Performance tests, Aerial reconnaissance), Detection, Design, Analysis, Measurement, Tables, Job analysis, Human engineering, Test methods.

The purpose of this experiment was to determine whether or not performance on a visual vigilance task is aided by displaying reference signals adjacent to the display constituting the vigilance task. Four conditions were studied. In a control condition the adjacent reference display was never employed. In a second condition the observers could demand activation of the reference display whenever they wished, and reference signals were generated during the activation period. In a third condition the experimenter activated the reference display at arbitrarily chosen intervals and reference signals were generated during the activation period. In a fourth condition the experimenter activated the reference display at arbitrarily chosen intervals but reference signals were never generated. Ninety-six observers were employed, 24 in each condition. (Author)

AD-428 333 Div. 28
OTS price $1.60

Institute for Psychological Research, Tufts U., Medford, Mass.
INNOVATION IN TASK ORIENTED COMMUNICATION.
Final rept.,
by Thornton B. Roby. 30 Aug 62, 15p.
Grant AF AFOSR62 372
AFOSR J1372 Unclassified report

Descriptors: (*Language, Training), (*Social communication, Verbal behavior), Transfer of training.

The objective of this project was to examine the processes whereby people develop a new language to deal with a distinctively new environment or task. The impetus for this research came from the observation that whenever a new technological development is introduced, the people most closely connected with it--for example, technicians and operators--very rapidly develop a convenient, concise jargon which permits them to express themselves and to cope with whatever the coordinative requirements of the task may be. Typically, of course, this language innovation is based upon a transfer of existing language elements. The present study then is prepared to set up such conditions deliberately and in a controlled way, and to study the determinants of the new language construction as well as to study the form that the language itself takes. The results of this study indicated better performance for the two-way conversation condition. It also indicated differences in stimulus materials: the polygon for which the variations were more pronounced were easier to identify than those in which fine details had to be differentiated. (Author)

AD-428 421 Div. 28, 32
OTS price $4.60

Institute for Defense Analyses, Washington, D. C.
A SYSTEM FOR CLASSIFYING BEHAVIORAL AND SOCIAL SCIENCE AND ECONOMIC RESEARCH IN THE DEPARTMENT OF DEFENSE,
by Joseph E. Barmack. Nov 63, 44p. Rept. no. HQ63 1707; S121
Contract SD50, Task 8
Unclassified report

Descriptors: (*Scientific research, Classification), (*Research program administration, Operation), Behavior, Social science, Economics, Subject indexing, Department of defense.

The purpose of this study was to develop a preliminary schema for classifying research sponsored by the Department of Defense in the

behavioral and social sciences and in economics. The system is intended to provide the Office of the Director of Defense Research and Engineering with sufficiently detailed and accurate information of programmed research to permit it to exercise its responsibility for broad guidance. Of the four systems of reporting currently required by the Department of Defense, the so-called OSD Classes System is considered to be most adaptable for classifying research in the behavioral and social sciences and economics. Without intending to replace any one of the four systems, the OSD Classes System is redefined and elaborated into a fifteen-cell matrix of three categories of research and five subject-matter fields. The three categories are (1) Basic Research, (2) Applied Research, and (3) Development, Test and Evaluation Research. The five fields are (1) Personnel Research, (2) Human Performance in Military Systems, (3) Psychological Operations, (4) Human Support and Maintenance, and (5) Economic Analysis and Management. (Author)

AD-428 535 Div. 28
OTS price $1.60

Maryland U., College Park.
ATTITUDES TOWARD CIVIL LIBERTIES AMONG JAPANESE AND AMERICAN UNIVERSITY STUDENTS,
by Elliott McGinnies. Aug 63, 19p.
Contract Nonr372001, Proj. NR171 250
Unclassified report

Descriptors: (*Attitudes, Students), Group dynamics, Tables, Public opinion, Public relations, Government employees, Leadership, Religion.

Teenage attitudes toward a number of social issues, including civil liberties, have been studied in the United States by Remmers and Radler and in Japan by Kato. Remmers and Radler reported that nearly half of America's teenagers are not committed to freedom of the press; over one-half approves censorship of books, newspapers and magazines; and one-third believe that persons should be forced to testify against themselves if necessary. Another one-third does not believe in freedom of speech, and twenty-six per cent think that the police should be allowed to search a person or his home without a warrant. An interesting feature of these results, of course, is the fact that some of the expressed attitudes are in direct contradiction to the principles embodied in the Bill of Rights. In contrast, Kato found that three-fourths of his sample of Japanese high school students favored complete freedom of the press; nearly three-fourths believed that a person should not be compelled to testify against himself; and about eighty per cent were opposed to search by police without a warrant and to police wiretapping. Kato concludes that in comparison with American teenagers, Japanese adolescents expressed more democratic political attitudes; that is, more concern with people's rights and freedoms.

AD-428 547 Div. 28
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS OF SPACE PSYCHOLOGY,
by F. D. Gorbov. 7 Oct 63, 23p.
FTD MT63 68 Unclassified report

Trans. from Russian Periodical, Voprosy Psikhologii, No. 6, pp. 3-13, 1962.

Descriptors: (*Psychology, Space flight), (*Aviation personnel, Performance tests), (*Aptitude tests, Aviation personnel), Human engineering, Pilots, Machine translation, Group dynamics, Astronauts, Immunity, Noise, Nervous system, Operation.

Space psychology as a branch of science is unique. Lying at its basis are the achievements of general psychology and human engineering, the principles of the higher nervous activity and the essential medical requirements for the selection of flying personnel. The author emphasizes the importance of psychological experimental methods both during the training of cosmonauts and during the flight itself. A schematic professiogram is given. On the basis of results obtained in special loading tests applied in the training of flying personnel the author advances the principle of reproduction as one of fundamental importance for space psychology. Some new methods of psychological research founded on this principle are proposed, such as diagnoses of suggestivity and noise-immunity. The use of a homeostatic method in the study of group psychology permits differentiating several patterns of individual strategy in the integrative performance of operators. (Author)

AD-428 565 Div. 28
OTS price $2.60

Human Factors Research, Inc., Los Angeles, Calif.
A STUDY TO DETERMINE THE EFFECTS OF PLACEBOS UPON PERFORMANCE IN A VIGILANCE TASK,
by J. O'Hanlon, Jr., E. A. Schmidt and C. H. Baker. Jan 64, 16p. Technical rept. 750 3
Contract Nonr 4120 00, Proj. NR196 035
Unclassified report

Descriptors: (*Engineering, Psychology), (*Detection, Performance tests), (*Performance tests, Drugs), Signals, Stimulation, Vision, Visual acuity, Human engineering, Frequency, Toxicity, Lactates, Analysis of variance, Behavior.

An experiment was undertaken to determine the effects of ingested placebos upon signal detection performance in a vigilance task. The observers were given to understand that the placebos (pills) had certain specific, though alleged, effects upon human alertness. One placebo, colored white, was alleged to contain chemicals which affected performance in an unknown manner. Another placebo, colored orange, was alleged to make people more alert. A third placebo, yellow, was alleged to make people less alert. Eighty observers undertook a conventional vigilance task, 20 assigned to each condition of white pill, orange pill, and yellow pill, and 20 performed the task without a pill. There were no differences in detection performance among the four conditions. It was concluded that in a conventional vigilance task the ingestion of placebos which observers believe to be drugs having definite positive, negative, or unknown effects upon signal detection performance does not affect performance. (Author)

AD-428 615 Div. 28
OTS price $1.10

Systems Research, Ltd., London (Gt. Brit.).
A STUDY OF GROUP DECISION MAKING AND COMMUNICATION PATTERNS UNDER CONDITIONS OF STRESS AND OVERLOAD, WHEN THE PARTICIPANTS ARE PERMITTED TO FUNCTION AS A SELF-ORGANISING SYSTEM.
Quarterly technical status rept. no. 3,
1 July-30 Sep 63.
30 Sep 63, 9p.
Contract DA91 591EUC2753
Unclassified report

Descriptors: (*Decision making, Group dynamics), (*Communication systems, Pattern recognition), Social communication, Control panels, Display systems, Stresses, Interception.

AD-429 034 Div. 28, 20, 7
OTS price $2.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
A HUMAN ENGINEERING EVALUATION OF THE ML-1 AND ML-1A MOBILE LOW-POWER NUCLEAR POWER PLANT.
Rept. for 1 Apr 62-30 Apr 63,
by B. Lawrence Sova, Jr, Marlin E. McCahan, and Richard H. Dewey. Oct 63, 115p.
HEL TM19 63 Unclassified report

Descriptors: (*Human engineering, Nuclear power plants), (*Nuclear power plants, Human engineering), Mobile, Training devices, Design, Job analysis, Specifications, Effectiveness, Gases, Storage, Power plants (Establishments), Tables.

This report is a continuation of the U. S. Army Human Engineering Laboratories' human engineering evaluation of the ML-1 Mobile Nuclear Power Plant and is being conducted at the request of the U. S. Army Corps of Engineers. It covers the period 1 April 1962 to 30 April 1963 and includes a simultaneous task analysis of the ML-1 start-up procedures, a review of the layout and operation of the Reactor, Power Conversion Skid, and Gas Storage Skid, the monitoring of the contractor's product improvement program, a proposed layout of the ML-1A Control Cab, a review of the training-simulator design. Recommendations are made for improving the operation and maintenance of this system. A brief description of the reactor plant is also included. (Author)

AD-429 114 Div. 28, 1
OTS price $9.60

North American Aviation, Inc., Columbus, Ohio.
FLIGHT SIMULATOR STUDY OF HUMAN PERFORMANCE DURING LOW-ALTITUDE, HIGH-SPEED FLIGHT,
by Harve E. Rawson. Nov 63, 102p.
Contract DA44 177tc803, Proj. 1D131201D159,
Task 9R38 10 005 04
ATRECOM TR63 52 Unclassified report

Descriptors: (*Performance tests, Pilots), (*Flight simulators, Human engineering), (*Pilots, Flight simulators), Low altitude, Flight speeds, Analog computers, Flight testing, Simulation, Training, Analysis, Job analysis, Display systems, Cockpits.

An investigation of the influence of low-altitude high-speed flight conditions on inflight operator performance of surveillance-centered tasks is reported. Six Army pilots and four Army observers ''flew'' approximately 278 hours on simulated three-hour missions involving five RMS gust-intensity levels and two airspeeds. The flights were made in a moving-base simulator that had a total travel of approximately 12 feet, an acceleration capability of ± 6 G, a functional control system, and an associated analog computer for obtaining solutions to equations of motion of a mechanized aircraft. Data were analyzed in terms of human performance aspects of the missions. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-428 594 Div. 29, 4
OTS price $3.00

Naval Supply Research and Development Facility, Bayonne, N. J.
THE CHEMICAL AND PHYSICAL CHANGES OCCURRING IN THE DEEP FAT FRYING OF POTATOES,
by Herman Strock. Aug 63, 124p.
Task NT F015 13 001 159
Unclassified report

Descriptors: (*Potatoes, Heating), Fats, Cooking devices, Chemical properties, Physical properties, Polymerization, Test equipment, Thermodynamics, Temperature, Time, Taste, Smell, Fatty acids, Iodine, Moisture, Energy, Acceptability.

A determination was made of the effects of temperature and agitation on frying fats; and the interrelationships of temperature and agitation in the deep fat frying of potatoes. These factors were assessed in relation to the acceptability of the deep fat fried potato and to the quality of the frying fat. It was found that after an initial frying period of 21/2-3 minutes, the internal temperature of the potato reached a constant of 216-222 F throughout the frying period. This observation was made at all frying temperatures used in this investigation. Iodine values were decreased significantly with the number of samples fried at any one temperature. Air incorporation by agitation had a marked effect upon the iodine value. The efficiency of the fryer as measured by difference between usable and total heat input was determined by use of the empirical formula developed and the measurement of the total heat input. A low temperature zone existed beneath the heating units of the control fryer. Upon reheating the fat, the condensation in the cold zone vaporized, expanded rapidly and in one instance blew the hot fat out of the fry kettle. A repetition of the above condition was prevented by mixing the hot fat during reheating. (Author)

AD-428 692 Div. 29
OTS price $1.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION EXPOSURE SUIT, CWU-10/P.
Final rept.,
by Wayne E. Williams and Clifford J. Whitham, Jr.
Jan 64, 8p.
TAC TR63 31D Unclassified report

Descriptors: (*Protective clothing, Operation), (*Exposure suits, Environmental tests), Reliability, Water, Effectiveness, Test methods, Extremities, Flight clothing, Airborne, Aircraft, Ventilation, Nylon, Rubber, Coatings, Polyethylene plastics.

The CWU-10/P Anti-exposure Coverall was evaluated to determine its overall suitability. The tests revealed that the coverall did have some improvements over previous types but is unacceptable in that it does not provide adequate protection for the extremities during immersion in cold water. Other deficiencies were revealed that will require correction before the CWU-10/P can be considered a suitable anti-exposure coverall. (Author)

AD-429 002 Div. 29
OTS price $1.25

Naval Supply Research and Development Facility, Bayonne, N. J.
EVALUATION OF FREEZE-DEHYDRATED BEEFSTEAKS FOR NAVY USE,
by B. MacNulty. Aug 63, 19p.
Unclassified report

Descriptors: (*Food, Freeze drying), Beef, Taste, Cost, Preparation, Storage, Navy.

A study was conducted to determine the suitability of freeze-dehydrated beefsteaks for Navy use. Two types of dehydrated beefsteaks procured were dehydrated rib-eye steaks, Type I, and dehydrated round steaks, Type IV. It was found that one pound of dehydrated rib-eye steaks yields approximately 1.65 pounds of ready-to-eat steaks, and one pound of dehydrated round yields 1.91 pounds of ready-to-eat steaks. The rib-eye steaks had no apparent defects; whereas, the round steaks had such defects as heavy connective tissue, excessive fat, and irregularity of shape, which adversely affected its over-all acceptability. Both the rib-eye and round steaks (without defects) were organoleptically acceptable. The rib-eye, on a per steak basis, due partially to a difference in portion size, costs approximately 72.5% more than the round steak. It was recommended that both types of steak not be considered as a direct substitute for fresh beefsteaks, but as an emergency item for shipboard use when such items are deemed necessary and cost is not a factor. In addition, the round steak not be considered unless the over-all quality of the product can be improved. (Author)

AD-429 184 Div. 29
OTS price $.75

New York State U., Stony Brook.
ANALYSIS OF LIMITING THERMAL CONDITIONS ENCOUNTERED BY A MANNED SPACE SUIT IN ORBIT.
Rept. for May 59-July 63,
by Thomas F. Irvine, Jr. and Kenneth R. Cramer.
Nov 63, 22p.
Proj. 6301, Task 630104
AMRL TDR63 102 Unclassified report

Report on Aerospace Systems Personnel Protection.

Descriptors: (*Flight clothing, Space flight) (*Pressure suits, Temperature control), Space environmental conditions, Design, Mathematical analysis, Temperature, Thermal conductivity, Distribution.

In this study, three thermal problems have been examined which occur in the design of space suits to be used when personnel are outside the parent vehicle. The first concerns the time-temperature variation of an infinite thermal conductivity suit exposed to extreme conditions of heating and cooling. The second is related to temperature differences which may occur from the top to the bottom of the suit, thereby causing physiological discomfort. Finally, the scheme was examined whereby these temperature differences might be ameliorated by circulating a fluid in passages behind the suit material. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-427 923 Div. 30
OTS price $4.60

Naval Air Test Center, Patuxent River, Md.
TECHNICAL EVALUATION OF FIELD INTENSITY METER NM-52A.
Final rept.,
by Claude M. Wooten. 3 Mar 61, 1v.
Proj. SF0131511
NATC WST07 127 Unclassified report

Descriptors: (*Interference analyzers, Performance (Engineering)), Radio interference, Test sets, Ultrahigh frequency, Measurement.

The Radio Interference-Field Intensity Meter NM-52A was technically evaluated and compared to its prototype, Radio Test Set AN/URM-17. The NM-52A is a superior Field Intensity Meter to the AN/URM-17; however, there are a number of deficiencies which should be corrected prior to acceptance for service use. The NR-52A operates over a frequency range of 375 to 1000 MC. (Author)

AD-427 924 Div. 30
OTS price $9.60

Naval Air Test Center, Patuxent River, Md.
TECHNICAL EVALUATION OF RADIO INTERFERENCE MEASURING SET AN/URM-138(XN-1).
Final rept.,
by Claude M. Wooten. 1 Sep 61, 1v.
NATC 60 16 1F695A Unclassified report

Descriptors: (*Interference analyzers, Performance (Engineering)), Test sets, Radio interference, Ultrahigh frequency, Superhigh frequency, Measurement, Harn antennas.

The Radio Interference Measuring Set AN/URM-138 (XN-1) covering the 1.0 - 10.7 kilomegacycle frequency region was evaluated in accordance with specification MIL-R-16336(SHIPS) of 14 October 1959. This experimental model was found deficient in several areas, both electrically and mechanically. There are, however, a number of improvements in this model which should be incorporated in further developments. (Author)

AD-427 925 Div. 30
OTS price $5.60

Naval Air Test Center, Patuxent River, Md.
TECHNICAL EVALUATION OF RADIO INTERFERENCE MEASURING SET AN/PRM-25.
Final rept.,
by T. R. Gardner. 18 Apr 63, 1v.
Proj. SF0131503
NATC WST4 242 Unclassified report

Descriptors: (*Interference analyzers, Performance (Engineering)), Measurement, Radio interference, Test sets, Medium frequency, High frequency, Transistors, Portable (Man-portable).

The Radio Interference Measuring Set AN/PRM-25 was evaluated to determine whether any improvement over the existing Radio Interference Measuring Set AN/PRM-1 was obtained commensurate with the present state of the art. The results of the evaluation and recommendations are presented. (Author)

AD-427 926 Div. 30
OTS price $5.60

Naval Air Test Center, Patuxent River, Md.
TECHNICAL EVALUATION OF RADIO INTERFERENCE FIELD INTENSITY MEASURING SET AN/URM - 131 (XN -1).
Final rept.,
by D. P. Choporis. 25 Mar 63, 1v.
Proj. SF0131503
NATC WST4 178 Unclassified report

Descriptors: (*Interference analyzers, Performance (Engineering), Measurement, Test sets, Radio interference, Portable (Man-portable), Medium frequency, High frequency.

Radio Interference Field Intensity Measuring Set AN/URM-131(XN-1) was tested for conformance with Government specifications. Test results revealed the measuring set meets most specification requirements. It is recommended that the Radio Interference Field Intensity Measuring Set AN/URM-131(XN-1) be accepted for service use after the specified deficiencies are corrected. (Author)

AD-427 930 Div. 30
OTS price $9.60

Naval Air Test Center, Patuxent River, Md.
TECHNICAL EVALUATION OF NOISE AND FIELD INTENSITY METER MODEL NF - 112.
Final rept.,
by R. H. von Allmen, Jr. and W. V. Purdy.
28 Feb 63, 1v.
Proj. SF0131503
NATC WST4 95 Unclassified report

Descriptors: (*Measuring devices (Electrical and electronic), Electromagnetic fields), Radiofrequency interference, Calibration, Tests, Sensitivity, Gain, Tables, Electromagnetic shielding, Stability, Noise (Radio), Standing wave ratios.

The Noise and Field Intensity Meter NF-112 was evaluated in accordance with the manufacturer's specifications and applicable portions of MIL-R-16336A(SHIPS). The NF-112 was found to be deficient in several areas. There are, however, several desirable design features. NANEP recommends that the NF-112 not be considered for service use until the listed discrepancies are corrected. (Author)

AD-428 014 Div. 30
OTS price $.75

Bell and Howell Research Center, Pasadena, Calif.
MASS SPECTROMETER OUTPUT INTERPRETATION.
Rept. for 1 Apr 62-31 Oct 63,
by George D. Perkins. Oct 63, 21p.
Contract AF33 657 8174, Proj. 7360, Task 736005
RTD TDR63 4128 Unclassified report

Report on the chemistry and physics of materials.

Descriptors: (*Spectrophotometers, Design) Light transmission, Optics, Images, Visual signals, Lenses, Magnetic tape, Photomultipliers.

The output of a mass spectograph is a photographic plate containing a large number of spectral lines. In order to obtain the two most important bits of data per line necessary for converting an exposed photographic plate into a sample analysis an optical and mechanical system has been fabricated. This device measures a spectrum line position to 1/10,000 of an inch and measures its relative light transmission to 0.1%. It is primarily intended to acquire these

data rapidly and easily, and thereby shorten the time of analysis of solid samples. Its accuracy has been tested on a few sample runs with satisfactory results being obtained. A tabulation of 206,201 possible ionic species has been made and stored on magnetic tape for cataloging according to the needs of the individual mass spectroscopist. (Author)

AD-428 015 Div. 30, 15
OTS price $2.50

Adaptronics, Inc., Alexandria, Va.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS.
Final rept., 15 Oct 61-14 Oct 62,
by R. J. Lee and R. F. Snyder. Dec 63, 103p.
Contract AF33 657 7100, Proj. 4160, Task 416004
ASD TDR63 664, vol. 5 Unclassified report

Descriptors: (*Programming (Computers), Learning), Computers, Networks, Data, Teaching machines, Special-purpose computers, Programming language, Mathematical models, Perception.

The simulation of the complete Neurotron on a digital computer is described in terms of flow diagrams, and flow diagrams for certain types of network iteration and goal action are presented. Simulated results show that (1) a single Neurotron can learn gain, and (2) show extensive statistical samplings of the behavior of a 36 Neurotron network when input signal changes are simulated. The mathematics upon which the analog functions of the Neurotron are based necessarily involve an approximation due to the digital nature of the computer, but it is shown that for analog time constants spanning more than ten computer cycles, the error is small. (Author)

AD-428 030 Div. 30, 2
OTS price $11.00

Autometric Corp., New York.
APPLICABILITY OF CERTAIN MULTIFACTOR COMPUTER PROGRAMS TO THE ANALYSIS, CLASSIFICATION, AND PREDICTION OF LANDFORMS.
Final rept.,
by B. C. Aschenbrenner, W. Burgess, F. Doyle, J. Imbrie and J. Maxwell. 1 Dec 63, 1v.
Rept. no. CR107 2FR
Contract Nonr4145 00, Proj. 387 030
Unclassified report

Descriptors: (*Terrain, Vector analysis), (*Mapping, Computers), Mathematical models, Geography, Maps, Analysis of variance, Fourier analysis, Drainage, Stereoscopic map plotters, Photogrammetry, Programming (Computers), Digital computers, Radar images.

The aim of this study was to analyze, experimentally test, and evaluate the degree to which certain factor and vector analysis programs are useful for quantitative terrain analysis. Specific objectives were: (1) The testing of the usefulness of these computer programs for deriving meaningful and mappable terrain classes; (2) The determination of inherent correlations among various terrain parameters currently used; (3) The definition of a minimum, yet sufficient, terrain analysis system; and (4) The determination of the extent to which quantitative terrain analysis can be automated. The experimental results showed conclusively that the factor and vector analysis computer programs are a useful and valuable tool for quantitative terrain analysis. These terrain classifications also made possible the comparison of areas in terms of 'analogy'. Redundancies due to inherent correlations among the terrain variables were identified making it possible to identify the minimum number of terrain parameters required. (Author)

AD-428 032 Div. 30, 2
OTS price $8.10

RCA Service Co., Inc., Camden, N. J.
A 100 KILOWATT ARC SOURCE FOR SOLAR SIMULATION.
Rept. for Feb-Sep 63.
Jan 63, 75p.
Contract AF40 600 1029, Proj. 7778, Task 777801
AEDC TDR64 13 Unclassified report

Descriptors: (*Carbon arc lamps, Solar radiation), (*Sun, Simulation), Energy.

An account is given of the results of the 100 kw carbon arc testing program to determine the feasibility of using the high powered arc as a solar simulator source. A carbon arc burning mechanism, capable of operation at power levels in excess of 100 kw, was designed and built. Cored carbons of 25 mm and 35 mm sizes were burned at power levels from 40 to over 100 kw. Satisfactory stability of radiant intensity was obtained at relatively shallow angles between positive and negative electrodes. Polar intensity variations, micro-brightness profiles, spectral distributions and carbon consumption rates were obtained. (Author)

AD-428 068 Div. 30
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
ERRORS IN THE CALIBRATION OF RADIANCE RADIOMETERS,
by R. D. Rawcliffe. 21 Nov 63, 18p. Rept. no. TDR269 4260 101
Contract AF04 695 269
SSD TDR63 310 Unclassified report

Descriptors: (*Radiometers, Calibration), (*Calibration, Radiometers), Errors, Sensitivity, Ultraviolet equipment, Optical properties, Design, Corrections.

A procedure has been developed which can be used to correct for an error commonly encountered in the calibration of radiometers. If a radiometer designed for radiance determination is calibrated by means of a small source, loss of light due to imperfections in the optics can cause the radiometer to appear less sensitive than it actually is. Measurement of the angular response function provides a means for eliminating this error. (Author)

AD-428 080 Div. 30
OTS price $2.60

Stelma, Inc., Stamford, Conn.
DEVELOPMENT OF (PCM) DATA BUFFERS.
Quarterly progress rept. no. 1, 21 June-23 Oct 63,
by W. Reymond. Oct 63, 23p.
Contract DA36 039AMC03186E, Proj. DA36 039AMC
Unclassified report

Descriptors: (*Digital systems, Data transmission systems), Design, Computer logic, Packaged circuits, Tests.

The purpose of this project is the design and construction of two advanced development models of a low-speed and a high-speed converter (PCM Buffer), digital-to-digital--each for inserting a number of digital data channels into Data I or Data II of the PCM Multiplexers TD-352( )/U or TD-353( )/U, where the data inputs are asynchronous, to the PCM Multiplexers. (Author)

AD-428 099 Div. 30, 16
OTS price $3.00

Adaptronics, Inc., Alexandria, Va.
THEORY OF PROBABILITY STATE VARIABLE SYSTEMS.

VOLUME II: HISTORICAL DISCUSSION OF PSV DEVICES WITH EMPHASIS ON THE NEUROTRON.
Final rept., 15 Oct 61-14 Oct 62,
by R. J. Lee. Dec 63, 187p.
Contract AF33 657 7100, Proj. 4160, Task 416004
ASD TDR63 664, vol. 2 Unclassified report

Descriptors: (*Artificial intelligence, Models (Simulations)), Learning, Machines, Networks, Nerve cells, Bionics, Decision making, Perception, Conditioned reflex, Pattern recognition, Scientific research, Computer logic, Analog systems, Reasoning.

This volume traces the history and general background of Probability State Variable Devices, and defines their distinguishing features. The Reron, Artron, and Neurotron, each discussed in a separate section in this volume, represent a major portion of the field of Probability State Variable (PSV) devices. Mention is given to another device, Halpern's Self-Organizing Binary Logical Network, which would also be classed as a PSV device, and early related devices by Pierce, Kirsch, and Farley and Clark are noted. Most of these devices are able to learn logic functions, but the Neurotron combines logic with analog (gain-phase) functions, so that, in the Neurotron, Logic, gain, and time-constants are all subject to learning. (Author)

AD-428 144 Div. 30, 16
OTS price $2.50

Weather Forecasting Research Center, U. of Chicago, Ill.
ANALOG COMPUTER SIMULATION OF TEMPERATURE REGULATION IN MAN.
Rept. for Oct 60-Dec 62,
by Arthur C. Brown. Dec 63, 108p.
Contract AF33 616 7342, Proj. 7164, Task 716409
AMRL TDR63 116 Unclassified report

Report on Biomedicnl Criteria for Aerospace Flight.

Descriptors: (*Body temperature, Models (Simulations)), (*Mathematical models, Body temperature), Analog computers, Distribution, Man, Simulation, Analysis of variance, Metabolism, Respiration, Thermal insulation, Clothing, Temperature control.

The objectives of this study were (1) to derive the mathematical equations describing heat distribution and temperature regulation in man; (2) to solve these equations by the use of an electronic analog computer; (3) to use the computer to predict the response of a human to cold water immersion and to check the predictions against experimental data. The mathematical equations for temperature distribution were derived from the physical principles describing heat flow, first in the form of integral equations and the corresponding vector differential equations, and in the form of difference differential equations appropriate for electronic simulation. From these equations, a model of the body was constructed involving four concentric thermal elements. The equations describing the behavior of the thermal elements were simulated electronically. Feedback loops representing the analog of control of metabolism and vasomotor state were introduced into the model, simulating the human temperature regulation system. Solutions were generated by the computer under the specific condition of cold-water immersion, for varying clothing insulation and environmental (water) temperature. (Author)

AD-428 175 Div. 30
OTS price $1.60

Suffield Experimental Station (Canada).
STUDIES ON SHOCK WAVE PRESSURE-TIME GAUGES.
Interim progress rept.,
by J. C. Muirhead. 31 Oct 63, 9p.
Proj. D89 16 01 05
SES TN131 Unclassified report

Descriptors: (*Piezoelectric transducers, Pressure gages), (*Pressure gages, Piezoelectric transducers), Barium alloys, Lead alloys, Ceramic materials, Temperature, Impact shock, Physical properties, Time.

A simple apparatus was set up with which the outputs of various elements could be examined. Ceramic cylinders were loaded by a 3189 gram weight, held by a string. The weight was released by burning the string. Output of the element upon release of the weight was measured. Cylinders of barium titanate and lead metaniobate ceramics were tested. The procedure followed was to determine the output of the cylinder upon release of the weight, to heat the element, to allow it to return to room temperature, and to redetermine its output. It was found necessary to give particular emphasis to the first result obtained after re-cooling. (Author)

AD-428 249 Div. 30
OTS price $3.60

Army Missile Command Computation Center, Army Missile Support Command, Redstone Arsenal, Ala.
INTELLIGENCE: A DEFINITION AND MILITARY IMPLICATIONS,
by Roger A. MacGowan. 16 Jan 64, 25p.
AMC COMP TR1 64 Unclassified report

Descriptors: (*Data processing systems, Military intelligence), (*Military intelligence, Data processing systems), Input-output devices, Control systems, Operation, Verbal behavior, Adjustment (Psychology), Errors, Automation, Bionics, Memory, Behavior, Learning, Conditioned reflex, Emotions.

The fourfold purpose of this paper is: (1) to describe a theory of intelligence, (2) to illustrate one approach to describing precisely all intelligent psychological phenomena (that is, operations on two dimensional patterns of information), (3) to indicate the importance of developing a good statistical-logical notation suitable for describing intelligent processes or operations, (4) to describe some potential military applications of intelligent processes and the automata necessary to accomplish these tasks. Any meaningful discussion of intelligent psychological phenomena, whether biological or artificial, must include both a mathematical definition of the individual information processing functions under discussion, and diagram of the communications system (the physical interconnections) for accomplishing these information processing functions. (Author)

AD-428 306 Div. 30, 18
OTS price $10.10

IBM Research Center, Yorktown Heights, N. Y.
APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS). VOLUME II. MULTIPLE AND SIMULTANEOUS SERVICES FROM A SINGLE COMPUTER COMPLEX.
Quarterly rept. no. 3 for period ending 28 Feb 62.
28 Feb 62, 1v.
Contract AF19 626 10
Unclassified report

Descriptors: (*Data storage systems, Automatic), (*Data processing systems, Programming (Computers)), Programming languages, Computer storage devices, Analysis, Costs, Design, Computers, Military intelligence.

AD-428 308 Div. 30, 29
OTS price $8.60

Quartermaster Research and Engineering Command, Natick, Mass.
GENERAL DESCRIPTION AND SITE CHARACTERISTICS. PART I. PART II. TECHNICAL DESCRIPTION OF FACILITY.
Aug 61, 1v.
Unclassified report

Descriptors: (*Food, Preservation), (*Radiation effects, Preservation), (*Radiation effects, Test facilities), Ventilation, Air conditioning equipment, Safety, Control, Environmental tests, Design, Specifications, Safety devices.

The Quartermaster Radiation Laboratory to be built at Natick, Massachusetts, will be used for research and development on processes for the preservation of foods by irradiation. Consistent with this primary objective and with economy, the design will provide for the possibility of future food irradiation on a semi-production basis requiring expansion of the food preparation area, and for possible radiation research on materials other than food. The design will also take into consideration the large number of visitors that is anticipated. The laboratory includes a megacurie level cobalt-60 cell, a 24 Mev linear accelerator, nuclear control laboratories, a pilot plant area for food preparation, a taste test kitchen, and other support areas. The material contained in this section relates to an over-all description of the radiation laboratory, which will include a general facility description, site location and the various related environmental characteristics. Part II contains the technical description of the QMRL, including mechanical operation of the building, safety controls and devices, and descriptions of the radiation cells and their operation. (Author)

AD-428 316 Div. 30
OTS price $31.00

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
THE LOGIC DESIGN OF ADAM, A PROBLEM-ORIENTED SYMBOL PROCESSOR. APPENDIX II. LOGIC DRAWINGS.
Final rept.,
by R. F. Schauer and A. P. Mullery. 19 Aug 63, 133p.
Contract AF19 628 1621, Proj. 4641, Task 464105
AFCRL 63 510 Unclassified report

Descriptors: (*Programming (Computers), Computer logic), (*Computer logic, Wiring diagrams), (*Data processing systems, Design), Data storage systems, Input-output devices, Control, Programming languages, Automatic, Time.

AD-428 320 Div. 30, 28
OTS price $13.50

Minneapolis-Honeywell Regulator Co., Minn.
STUDY OF PILOT-CONTROLLER INTEGRATION FOR EMERGENCY CONDITIONS,
by G. Cole, M. Bender, R. Shoquist, R. Santella, and D. Lovinger. 1963, 175p.
Contract AF33 657 7601, Proj. 8219, Task 821904
RTD TDR63 4092 Unclassified report

Descriptors: (*Aviation accidents, Flight control systems), (*Flight control systems, Human engineering), (*Pilots, Job analysis) (*Flight control systems, Design), Failure (Mechanism), Operation, Performance tests, Mathematical predictions, Handbooks, Mathematical analysis, Theory, Analysis, Tables, Electronic equipment, Communication theory.

The objective of this program was to develop a design concept which will minimize catastropic flight control failures through appropriate pilot-controller integration. This report describes a systematic procedure composed of techniques within the field of flight control design, reliability, and human factors which yields a practical approach for effective design of an integrated pilot-controller system. Application of the procedure was made to an advanced vehicle mission phase as an aid to the study group in determining practicality of the approach. Areas where further advances of the study are limited by the state-of-the-art are pointed out as recommendations for future investigation. (Author)

AD-428 327 Div. 30, 9
OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
MHD WIND TUNNEL PROGRAM.
Rept. for 1 July-30 Sep 63,
by H. Mirels. 13 Dec 63, 17p. Rept. no. TDR269 4230 10 4
Contract AF04 695 269
SSD TDR63 317 Unclassified report

Descriptors: (*Shock tubes, Magnetohydrodynamics), (*Hypersonic wind tunnels, Design), Frozen equilibrium flow, Configuration, Electrodes, Electric arc, Heating, Acceleration.

The basic design of a pulsed type Magnetohydrodynamics (MHD) wind tunnel using a hotshot source is outlined. The hotshot portion of the facility is being assembled and will be studied experimentally. (Author)

AD-428 356 Div. 30
OTS price $1.60

Air Force Office of Scientific Research, Washington, D. C.
LONG RANGE RESEARCH IN INFORMATION RETRIEVAL,
by Harold Wooster. 1963, 16p.
AFOSR 4573 Unclassified report

Reprint from the Proceedings of a Symposium on Information Retrieval Today, held Sep 62 at the University of Minnesota, pp. 149-164. (Copies supplied by DDC)

Descriptors: (*Information retrieval, Scientific research), (*Data storage systems, Scientific research), (*Scientific research, Information retrieval), Machine translation, Speech, Artificial intelligence, Language, Pattern recognition, Theory, Analysis.

AD-428 477 Div. 30, 26, 9
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
DESIGN AND CONSTRUCTION OF NEW CAVITATION MACHINE,
Comp. by K. P. Karpoff. 18 Nov 63, 7p.
BR D LR C1070 Unclassified report

Descriptors: (*Cavitation, Test facilities), (*Hydraulic systems, Cavitation), Wear resistance, Machines, Hydraulic models, Materials, Coatings, Surfaces, Surface properties.

A new simplified Venturi-type apparatus with a single test compartment was designed. This apparatus is operated by a 60 hp electrical pump driven at 1,500 rpm resulting in about 150 feet of pressure head, 98 ft/sec velocity and 2.1 cfs discharge of water through 1/4 by 12-inch throat of the cavitation test apparatus. The series of trial runs of the cavitation test apparatus, using a transparent plastic plate in place of the usual

specimen, show that the center of the vapor collapse area is located directly under the specimen, when the upstream and downstream pressures are 59.0 and 17.8 psi gage respectively, resulting in 41.2 psi or 95 feet of differential hydraulic pressure. Evaluation of cavitation resistance of different types of tested materials is based on complete surface destruction occurring in a percentage of 250 hours which was the maximum period used in the laboratory test. (Author)

AD-428 486 Div. 30, 2, 14, 13
OTS price $1.60

Bureau of Reclamation, Denver, Colo.
PROGRESS OF ULTRASONIC TESTING STUDIES,
comp. by L. T. Cleaver. 2 Aug 63, 10p.
BR D LR C1056 Unclassified report

Descriptors: (*Nondestructive testing, Ultrasonic radiation), (*Fracture (Mechanics), Nondestructive testing), Concrete, Dams, Foundations (Structures), Underground structures, Rock (Geology), Feasibility studies, Steel, Test equipment, Instrumentation.

A program of evaluating the Soniscope ultrasonic test instrument as a means of performing reflection tests on rock in situ is being conducted. Samples of both homogenous and nonhomogenous materials are used in order to evaluate the effect of material composition on the propagation of ultrasonic signals, especially those signals reflected by any discontinuities existing in the test specimen. As a check of the sound propagation characteristics of each specimen used, ultrasonic signals are first transmitted through the test specimen and the sound velocity value in feet per second is determined for the specimen. The tests show that ultrasonic signals can be transmitted through all specimens used, both of homogenous and nonhomogenous material, with the Soniscope. However, usable signals reflected by discontinuities in the specimen are obtained only in the case of homogenous material. (Author)

AD-428 497 Div. 30
OTS price $3.60

ARO, Inc., Tullahoma, Tenn.
TEMPERATURE EFFECTS ON THE CAPTURE COEFFICIENT OF CO2,
by J. P. Dawson and J. D. Haygood. Jan 64, 28p.
Contract AF40 600 1000, Proj. SW2204
AEDC TDR63 251 Unclassified report

Descriptors: (*Cryogenics, Pumps), (*Space environmental conditions, Test equipment), (*Carbon dioxide, Low temperature research), Test methods, Vacuum pumps, Mathematical prediction, Pressure, Gases, Molecular properties, Temperature, Surface temperature, Experimental data, Mathematical analysis, Equations, Thermodynamics, Argon, Nitrogen, Simulation, Altitude chambers.

Results are presented for the second phase of an experimental program designed to study the effects of gas and cryosurface temperatures on the capture coefficients in cryopumping. Experimental pumping speeds and capture coefficients were obtained for 195, 300 and 400 K carbon dioxide on a spherical cryosurface with temperatures ranging from 12 to 77 K. These measurements cover a pressure range of 10 to the -8th power to 10 1/100,000 mm Hg. Based on a potential well-energy barrier molecular model, an empirical equation is developed and found to correlate well with the experimental results. The cryopumping research program is to improve the quality of vacuum obtained in space simulated chambers and to predict chamber conditions during a test phase. (Author)

AD-428 567 Div. 30
OTS price $5.60

Digital Computer Lab., U. of Illinois, Urbana.
(No title).
Technical progress rept.
Nov 63, 51p.
Contract NA ONR36 58, Proj. NR048 106
Unclassified report

Descriptors: (*Digital computers, Design), Programming (Computers), Typewriters, Remote control system, Control system, Printed circuits, Input-output devices, Operation, Coding, Mathematical analysis, Tunnel diode, Electronic equipment, Tables.

Contents: High-Speed Computer Program; ILLIAC II System Programming and Operation; Circuit Research Program; Mathematical Methods; IBM 7090-1401 System; and General Laboratory Information.

AD-428 577 Div. 30
OTS price $1.60

Computer Command and Control Co., Philadelphia, Pa.
SUMMARY OF INVESTIGATION ON ASSOCIATIVE MEMORIES.
15 Jan 64, 11p. Rept. no. 5 101 5
Contract NOnr4068 00
Unclassified report

Descriptors: (*Computer storage devices, Pattern recognition), (*Pattern recognition, Computer storage devices), Ships, Position finding, Bubble chambers, Programming (Computers).

AD-428 642 Div. 30, 18
OTS price $2.60

Standard Electrical Products, Co., Dayton, Ohio.
APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS), VOLUME I.
Quarterly rept. no. 3 for period ending 28 Feb 62.
28 Feb 62, 27p.
Contract AF19 626 10
Unclassified report

Descriptors: (*Data storage system, Automatic), (*Data processing system, Operation), Analysis, Frequency, Networks, Communication theory, Mathematical models, Military intelligence.

AD-428 649 Div. 30, 28
OTS price $11.50

Washington U., Seattle.
MAN-COMPUTER INTERFACE STUDY.
Annual rept.,
by D. L. Johnson and A. L. Kobler. June 63, 155p.
Grant AFOSR62 366
Unclassified report

Descriptors: (*Computers, Manned), (*Decision making, Simulation), (*Public opinion, Computers), (*Computers, Game theory), Computer logic, Mathematical analysis, Attitudes, Measurement

This annual report deals with the progress made in the research of the Man-Computer Interface Study. Part I describes our development of a method for problem solving and learning related to trigonometry problems. The methods of solution and learning discussed and illustrated are sufficiently general that they may be extended to other areas of problems. Part II is concerned with research in computer game playing. The principal effort in this section is devoted to

tree-pruning methods as applied to the game of chess. Rather than emphasis upon scoring parameters with only secondary attention to tree-pruning, this study devotes primary attention to tree-pruning methods. Part III of the report describes continuing research dealing with human attitudes toward the man-machine relationship. The results of an analysis of an attitude scale are provided and discussed in this section. Included in the section is a paper published in the July 1963 TREND in Engineering. (Author)

AD-428 679 Div. 30
OTS price $2.60

Illinois U. Engineering Experiment Station, Urbana.
A DESCRIPTION OF PAPER TAPE CONTROL ROUTINES FOR THE CDC COMPUTER,
by H. Grush. Sep 63, 21p. Rept. no. TN21, RRL215
Contract Nonr1834 02, Proj. NR371 161
Unclassified report

Descriptors: (*Punched tape, Control), Programming (Computers), Computers, Motion.

The following is a brief description of a set of eight subroutines which have been written for the G-20 computer for use with the PT-10 paper tape station. A more complete description of the subroutines and their usage may be found in the subroutine library file at the 6th Street lab. Of the first five subroutines of the set, four are used to control the motion of the paper tape, and the fifth is used to read the characters on the paper tape, The last three subroutines of the set are used to read paper tapes punched with a specific format. (Author)

AD-428 711 Div. 30, 8
OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD OF STABILIZING AUTOMATIC CONTROL SYSTEMS OF VARIABLE STRUCTURE WITHOUT USING THE DERIVATIVES OF THE ERROR SIGNALS,
by S. V. Yemel'yanov and V. A. Taran. 16 Dec 63, 33p.
FTD TT63 1110 Unclassified report

Trans. from Izvestiys An SSSR, OTN, Tekhnicheskaya Kibernetika, Nr. 1, pp. 155-171, 1963.

Descriptors: (*Control systems, Optimization), Motion, Oscillation, Time, Inequalities, Nonlinear systems, Functions.

Using an automatic control system of second order with variable structure as an example, an attempt is made to illustrate the possibility of consturcting high-quality dynamic systems without introducing an input with respect to the first derivative in the control law. An automatic control system is considered variable structure described by the equations of oscillatory motion and an unstable aperiodic motion. The error signal is transformed by a linear filter with the transfer function; and the control function is introduced. The motion of the system (free oscillations) for different initial conditions is investigated and the effect of the time constant of the filter on the transient quality is studied. The control law is derieved. (Author)

AD-428 726 Div. 30
OTS price $8.10

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
THE LOGIC DESIGN OF ADAM, A PROBLEM-ORIENTED SYMBOL PROCESSOR PROGRAMMING MANUAL. APPENDIX I. Final rept.,
by R. F. Schauer and A. P. Mullery. 19 Aug 63, 79p.
Contract AF19 628 1621, Proj. 4641, Task 464105
AFCRL 63 510 Unclassified report

Descriptors: (*Programming (Computers), Instruction manuals), (*Mathematical logic, Design), (*Programming languages, Information retrieval), Data, Verbal behavior, Input-output devices, Errors, Theory, Data processing systems, Coding, Test methods.

This manual presents the coding techniques which will be used to prepare problems for solution on ADAM, an experimental digital data handling system. The problem was to design a computer capable of manipulating a broad range of data forms. Data was structured to include insturctions in such a way that they may be completely variable in length. The machine would also have a large character set so that various characters could be assigned to specific hardware functions and still leave a sufficient number to be used as general characters for symbolic names and data representation. ADAM has a character set with 128 assigned characters (those assigned to hardware functions) and 128 general characters. Examples have been abundantly used in this manual so that the reader may easily visualize the performance of each of the machine functions as it is explained. One of the dangers of giving examples, however, is that the reader might limit his concept of the function being discussed to the specific use being illustrated. This is not our intention here, especially since it is felt that only by using the broadest interpretation of each function is it possible to obtain the full power of the machine and its language. (Author)

AD-428 727 Div. 30, 15
OTS price $1.60

System Development Corp., Santa Monica, Calif.
PROBABILISTIC INFORMATION PROCESSING BY MEN, MACHINES, AND MAN-MACHINES SYSTEMS,
by Ward Edwards. 13 Aug 63, 9p. Rept. no. TM1418 000 01
Contract SD97 Unclassified report

Descriptors: (*Data processing systems, Probability), (*Cybernetics, Probability).

A discussion is presented of the argument that Bayes's theorem is a normative model for inductive inference. Results of several experiments are presented that indicate that human beings do not behave the way this normative model says they should; the implications of these ideas and findings suggest the design of information processing systems intended for business, military, or governmental use. Research in progress on such systems is described. (Author)

AD-428 736 Div. 30
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
THE TMB 5000 POUND, THREE-MASS VIBRATION GENERATOR, ITS DESCRIPTION AND OPERATION,
by Richard L. Price. Dec 63, 25p.
Proj. S F013 11 01
DTMB 1781 Unclassified report

Descriptors: (*Vibrators (Mechanical), Test equipment), Structural parts, Electrical properties, Circuits, Wiring diagrams, Operation, Rotation, Moments, Alternating current, Direct current, Maintenance, Checkout procedures.

A description is presented of the David Taylor Model Basin 5000-Pound, Three-Mass Vibration Generator designed to excite vibrations in large structures. Forces of up to 5000 lb in any direction perpendicular to the axis of rotation and moments of up to 8500 ft-lb can be generated over the frequency range from 0.42 to 33.3 cps. Forces and moments are varied by adjusting the eccentricity and speed of three rotating masses. The mechanical and electrical parts of the system and detailed operational instructions are described. An operation and maintenance check list is also included. (Author)

AD-428 795 Div. 30
OTS price $4.60

McGill U. (Canada).
PROJECT HARP. REPORT ON THE FIRST TWELVE FIRINGS AND STATUS AS OF JULY 30, 1963.
Nov 63, 1v. Rept. no. 63 5
Contract DA20 0180RD24562, DA20 018AMC0190R
Unclassified report

Descriptors: (*Payload, Gun launched), (*High altitude, Payload), (*Atmospheric sounding, Sabot projectiles), (*Sabot projectiles, Rocket assisted projectiles), (*Test vehicles, Gun launched), Firing tests (Ordnance), Trajectories, Performance (Engineering), Sodium, Thermite, Telemeter systems, Launching sites, Rocket motors (Solid propellant), Ascent trajectories, Descent trajectories, Phototheodolites, Feasibility studies.

The first objective is the determination of the economic and engineering feasibility of placing significant pay-loads at altitudes of interest using vertical firing guns. In general terms this means payloads up to several hundred pounds to altitudes of one hundred miles using non-assisted vehicles, and payloads up to one hundred pounds to several thousand miles using rocket-assisted vehicles. The second objective is to deomostrate the ability of these vehicles to perform studies of scientific interest both by releasing payload material at prescribed altitudes, and by direct on-board measurements of physical characteristics of the near-earth atmosphere with results telemetered back to ground receiving stations. The third objective, and that which imparts to the program its long-term aspect, is the application of the technique for participation in various scientific studies of the earth's atmosphere in conjunction with, or as part of similar programs. This report describes both the current range status and the results of test firings as of July 30th, 1963. (Author)

AD-428 813 Div. 30
OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE AERODYNAMIC CALIBRATION OF THE AEDC 16-FOOT SUPERSONIC TUNNEL COMPRESSOR WITH THE FIRST CYLINDER REMOVED,
by C. L. Garner, Jr. Feb 64, 30p.
Contract AF40 600 1000, ARO Projs. PS2305, PS2407
AEDC TDR64 16 Unclassified report

Descriptors: (*Supersonic wind tunnels, Calibration), (*Axial-flow compressors, Supersonic wind tunnels), High-pressure compressors, Compressor stators, Compressor parts, Effectiveness, Axial-flow compressor blades.

The aerodynamic performance of the supersonic wind tunnel compressor with the first cylinder of the compressor removed was investigated at an inlet temperature of approximately 55F and compressor exit pressure levels of 300 and 1200 psfa at the design speed of 600 rpm. The overall performance of the three-cylinder configuration was considerably improved when the first and second cylinder stator blade settings were mismatched 6 degrees. This change increased the maximum three-cylinder configuration pressure ratio from 4.59 to 5.00. The maximum pressure ratios available are 1.57 at 108,800 cfs, 2.58 at 113,500 cfs, and 5.00 at 109,000 cfs for the one-, two-, and three-cylinder configurations, respectively. Increasing the stagnation pressure from 300 to 1200 psfa produced up to a 10% increase in volume flow for the two-cylinder configuration and up to an 11% increase in volume flow for the three-cylinder configuration. (Author)

AD-428 839 Div. 30, 18, 28
OTS price $6.60

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES SESSION 15 INFORMATION SYSTEM PERFORMANCE EVALUATION.
Jan 64, 59p. Rept. no. SS15
Contract AF33 600 39852, Proj. 7040
ESD TDR63 474 15 Unclassified report

Descriptors: (*Symposia, Information retrieval), (*Data processing system, Operation), Effectiveness, Training, Design, Decision making, Simulation, Analysis, Personnel, Control, Performance tests, Visibility, Operator (Personnel), Human engineering, Job analysis.

This session deals with the problems of evaluating the performance of a military information processing system between the time it is devised and the time when it is obsoleted. The session is tripartite, dealing with (1) the criteria involved in judging performance effectiveness of systems, (2) the use of the ADCS Training Program in system performance evaluation, and (3) the application of Normative Exercising as a system design aid. In considering the problem of establishing criteria by which to evaluate systems, the three variables (environmental conditions, the state of the system, and a knowledge of the probable consequences of alternative action) which importantly influence performance are described. The efficacy of Normative Exercising as an analytical aid of design purposes in the early stages of a particular system's evaluation is indicated, particularly when criteria are lacking with which to test outcomes of system function, when there are many conflicting views as to how to arrive at a problem solution.

AD-428 842 Div. 30, 10
OTS price $2.60

IIT Research Inst., Chicago, Ill.
A STUDY OF THE FUNDAMENTALS OF LIQUID PROPELLANT SENSITIVITY.
Technical progress rept. no. 1,
by Ted Erikson. 10 Jan 64, 22p. Rept. no. IITRI C6024 4
Contract AF04 611 9566, Proj. C6024
Unclassified report

Descriptors: (*Liquid rocket propellants, Sensitivity), (*Shock tubes, Cryogenics), Low temperature research, Ignition, Temperature, Pressure, Carbon compounds, Nitrogen compounds, Fluorine compounds, Laboratory equipment, Chromatographic analysis, Vapor pressure, Design, Simulation, Test methods, Ignition systems, Test equipment.

A cryogenic adaptation of a shock tube was designed, and it is expected that it can be used for the testing of materials at temperatures down to -150C. The final assembly of this modification was started. A chromatographic column and the associated equipment are being provided for purification of the test materials before sensitivity testing. The approach to propellant desensitization is based on an evaluation of the various parameters which affect the initiation, growth, and propagation of explosive liquid systems. Shock-tube testing will be a primary experimental tool for the evaluation of the parameters. Specific parameters to be studied are termperature, pressure, and composition of the gas in (practically) instantaneous contact with the surface of a condensed phase. Flash irradiation will be used as a supplementary test when feasible. Some of the problems that will probably be encountered during the procurement, handling, purification, and testing of such compounds were evaluated. (Author)

AD-428 856 Div. 30
OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
DESIGN METHOD FOR DOUBLE-WALLED EXTERNAL PRESSURE VESSELS,
by M. V. Churchill. 1 Oct 63, 1v.
NOL TR63 249 Unclassified report

Descriptors: (*Pressure vessels, Design), (*Structural shells, Stiffened cylinders), Equations, Underwater ordnance, Stresses, Aspect ratio, Stability, Elasticity, Optimization, Loading (Mechanics), Elastic shells, Beams (Structural).

By pursuing the analogy which exists between the reinforced pressure vessel and the beam on an elastic foundation, and by systematic application of the principle of balanced design, a set of equations is derived by which optimum values for wall thickness, Reinforcement size and spacing can be calculated directly from the shell radius, the design pressure, and the mechanical properties of the material. The element of trial and error is virtually eliminated ane the use of iterative methods is restricted to a few cases in which convergence is quite rapid. The effect of rigid end bulkheads is discussed and a means of minimizing secondary stresses from that source is proposed. A sample calculation is given and a comparison made with designs produced by other methods. (Author)

AD-428 879 Div. 30
OTS price $1.60

Electro-Mechanics Co., Austin, Tex.
AN ELECTRONIC SYSTEM FOR ANALYZING VARIABLE-AREA MAGNETOGRAMS.
Final engineering rept. 2, 1 Mar 60-30 Apr 63,
by R. L. Waters, F. C. Tormollan, F. J. Morris and E. J. Chernosky. 30 May 63, 13p.
Contract AF19 604 5520, Proj. 8601, Task 860102
AFCRL 63 939 2 Unclassified report

Descriptors: (*Data processing systems, Magnetic fields), Photographic recording, Systems, Photographic paper, Earth, Transistors, Instrumentation, Digital systems.

The Vestine-Chernosky method provides a photographic recording of the earths magnetic field. Recording variations in the earth's magnetic field by this method results in a variable-area record. It was for the purpose of evaluating such records that the design and development of a transistorized electronic system called the Data Assimilator, Digitalizer and Analyzer (DADA) was undertaken. This report describes the development and checkout of the system. The described system utilizes transistorized digital plug-in modules. (Author)

AD-428 895 Div. 30, 31
OTS price $7.60

Computer Command and Control Co., Philadelphia, Pa.
AN AUTOMATED SEA SURVEILLANCE SYSTEM,
by N. S. Prywes, W. I. Landauer, L. J. Cohen and D. Lefkovitz. 1 Jan 64, 70p. Rept no. 4 101 4
Contract Nonr406800
Unclassified report

Descriptors: (*Merchant vessels, Data processing systems), (*Data processing systems, Merchant vessels), Computer storage devices, Data storage systems, Maintenance, Data, Programming (Computers).

The organization and maintenance are presented of an automated sea surveillance file for merchant ships. The solution of this problem must be based on a description and definition of the file itself (formats of records in the files and incoming reports) and flow-charts describing the updating processes. However, the problem of sea surveillance is so extensive that to consider all the processes involved is beyond the scope of this investigation. Therefore only the more fundamental processes were considered. The study was conducted as a test case for evaluation of the usefulness of new concepts in computer memory organization generally, and the application of associative memories in particular. (Author)

AD-428 915 Div. 30, 9
OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE PUMPING OF GAS MIXTURES WITH COMBINATIONS OF PUMPING SYSTEMS IN A SPACE SIMULATION CHAMBER,
by C. E. Cheeseman and N. C. Latture. Feb 64, 24p.
Contract AF40 600 1000, Proj. SM2301
AEDC TDR63 260 Unclassified report

Descriptors: (*Gas pumps, Design), (*Space environmental conditions, Simulation), Gases, Simulation, Cryogenics, Mixtures, Diffusion pumps, Hydrogen, Nitrogen, Water vapor, Tests, Titanium, Velocity, Test facilities, Performance (Engineering), Partial pressures, Test equipment, Pumps, Adsorption, Altitude chambers, Space flight.

A test was conducted in a 460 cu ft. cylindrical space simulation chamber, to determine the pumping speeds of various combinations of pumping systems for common gases, admitted individually and in mixtures to the chamber, and to examine pumping speed deviations caused by the presence of the mixture. The evaluated pumping systems consisted of 350 sq ft. of 77 K cryosurfaces, two separate configurations of 20 K cryosurfaces, two LN2-baffled 32-in. diffusion pumps, and a titanium evaporation pump. Gas inputs were mixtures of nitrogen, hydrogen, and water vapor. Increases of from 50 percent to 1000 percent in H2 pumping speed were achieved by the utilization of the titanium evaporation pump, which demonstrated a decrease in H2 pumping speed in the presence of other gases attributable to poisoning of the fresh titanium surface. Increases in N2 pumping speeds were observed to result from increased H20 vapor input. All other combinations of mixtures and pumping systems examined behaved as predicted by individually admitted gas loads.

AD-428 931 Div. 30
OTS price $3.60

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES. SESSION 5. MAN-COMPUTER INFORMATION TRANSFER.
Jan 64, 27p. Rept. no. MITRE SS5
Contract AF33 600 39852, Proj. 7040
ESD TDR63 474 5 Unclassified report

Descriptors: (*Information retrieval, Design), (*Symposia, Information retrieval), Operation, Simulation, Programming (Computers), Programming languages, Data processing system, Control systems, Test methods, Pattern recognition, Input-output devices.

The introduction states that people are poorly matched to computers because of present constraints of languages and devices used. There is a need and place for wider range of direct graphical input devices and languages. Major stumbling blocks are removable by sufficient effort. Direct communication between people is quite simple by the use of media. Through the choice and combination of these media, and with a constant feedback of attention, a lecturer can communicate with and teach concepts to a classroom. In contrast, human-generated inputs to machines are much more limited. Graphical languages, diagrams, symbols, etc., for inputs, with a close graphical output feedback capability, would greatly simplify many problems. A number of devices, software, and language forms are described. The summary restates the problem and challenges the designer to produce new forms of graphical languages as useful and powerful tools for the ultimate human user. (Author)

AD-428 957 Div. 30, 13
OTS price $4.60

Bureau of Reclamation, Denver, Colo.
SURVEY OF FIELD LABORATORIES OF THE BUREAU OF RECLAMATION, 1962,
comp. by O. F. McNeel. 15 Aug 63, 15p.
BR D GR14J Unclassified report

Descriptors: (*Laboratories, Research program administration), Soils, Surveying, Feasibility studies, Construction, Materials, Costs, Test facilities, Scientific personnel, Operation, Dams, Engineering geology, Concrete, Civil engineering.

A summary is given of the status, personnel, and activities of the field laboratories of the Bureau of Reclamation for the calendar year 1962. The earth and concrete control laboratories are established primarily to provide (1) construction control during the construction of specific features. However, field laboratory facilities and personnel are often used for other related functions, such as (2) foundation and materials explorations for reconnaissance, feasibility, and specifications designs for other features in the immediate vicinity, and (3) laboratory personnel are often required for other, but related, activities of a technical or scientific nature. Land classification laboratories are operated primarily to provide information as quickly as possible to land classification survey parties regarding physical and chemical properties of the soil. All land classification laboratories provide analytical data needed for project drainage evaluations and/or construction of drainage systems. No attempt has been made to separate drainage investigation costs from the land classification survey costs. (Author)

AD-428 965 Div. 30, 23
OTS price $4.60

Bureau of Naval Personnel, Washington, D. C.
ANNOTATED BIBLIOGRAPHY OF NEW DEVELOPMENTS RESEARCH BRANCH STUDIES, 1958-1962.
Jan 63, 45p.
Unclassified report

Descriptors: (*Naval personnel, Scientific research), (*Scientific research, Bibliographies), Data, Guided missiles, Tactical Air Command, Infrared communication systems, Operation, Control, Sidebands, Ships, Weapon systems.

AD-429 000 Div. 30
OTS price $5.00

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A FOURTH SURVEY OF DOMESTIC ELECTRONIC DIGITAL COMPUTING SYSTEMS,
by Martin H. Weik. Jan 64, 393p.
BRL 1227 Unclassified report

BLR rept. no. 1227, supplement to BRL rept. no. 1115 (PB171265).

Descriptors: (*Programming (Computers), Digital computers), (*Digital computers, Directories), (*Digital computers, Engineering), Electronics, Input-output devices, Personnel management, Management engineering, Production, Records, Costs, Reliability (Electronics), Standards, Time, Operation, Quality control, Power, Construction, Design, Specifications, Configuration.

The results are presented of the engineering and programming characteristics of one hundred twelve different electronic digital computing systems that have been developed since 1961. The report describes the application, numerical and arithmetic characteristics, input, output and storage systems, construction and checking features, power, space, weight, and site preparation and personnel requirements, production records, cost and rental rates, sale and lease policy, reliability, operating experience, and time availability, engineering modifications and improvements and other related topics concerning the computing systems. (Author)

AD-429 031 Div. 30, 17
OTS price $7.60

Lockheed Propulsion Co., Redlands, Calif.
DESIGN, FABRICATION AND HYDROTESTING OF A 120-INCH DIAMETER PRESSURE VESSEL USING 18 PERCENT NICKEL MARAGING STEEL.
Research Contract Status Rept. no. 8, 10 Oct-12 Nov 63,
by L. Colbert. 25 Nov 63, 67p. Rept. no. 609 P8
Contract AF04 611 8525
Unclassified report

Descriptors: (*Pressure vessels, Steel), (*Steel, Pressure vessels), Hydrostatic pressure, Fracture (Mechanics), Nickel alloy, Martensite, Aging (Materials), Austenite, Design, Failure (Mechanics), Stresses, Fractography, Microstructure, Corrosion, Tensile properties, Microscopy, Electron microscopy.

The detailed metallurgical analysis work performed in order to determine the cause of closure plate fracture during hydroburst testing of the Lockheed-Excelco 120-in. diameter, maraging 18% nickel steel prototype booster case is described. The metallographic and mechanical strength data presented has led to the belief that delamination

of the plate welded to the ring forging is largely responsible for the failure of the closure plate at around half the designed membrane stress. The delamination itself seems to have been triggered by the yielding of the retained austenite and cracking of carbides and nitrides in the banded areas of the plate, leading to the formation of a chain of small cracks followed by interplanar separation in the plate. (Author)

AD-429 059 Div. 30
OTS price $1.10

Giannini Controls Corp., Malvern, Pa.
MODEL FLY. ANALYSIS OF SUITABLE WIND TUNNELS,
by J. A. Hill. 30 Apr 63, 10p. TL1310
Contract AF33 616 8260
Unclassified report

Descriptors: (*Transonic wind tunnels, Test facilities), Model tests, Wind tunnel models, Aeroplane models, Jet fighters, Operation, Stability, Aerodynamic loading, Wind tunnels, Test methods.

The Model Fly program, directed at developing a complete dynamic wind tunnel model testing technology for early and inexpensive experimental determination of the following parameters for an air vehicle: (1) flight loads, (2) dynamic response characteristics, and (3) dynamic stability and control. The analysis consists of matching the test requirements with the characteristics of the available wind tunnels in the United States. The three testing programs required which involve wind tunnels are: (1) F-106 model static and dynamic measurements; (2) mount-inertia cancelling device preliminary evaluation; and (3) complete Model-Fly pitch plane demonstration. The analysis indicated that the 11 x 11 ft transonic wind tunnel located at the NASA Ames Research Center should be used to test the 1/10 scale elastic model of the F-106 aircraft. Other analyses indicate that the Transonic Circuit Tunnel located at the Arnold Engineering Development Center should be used for the balance of the Model Fly program.

AD-429 078 Div. 30
OTS price $4.60

Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF COMBINED-ENVIRONMENT TESTING FOR AIR FORCE EQUIPMENT.
Rept. for 2 Jan 61-25 Mar 63,
by Virgil J. Junker. Mar 63, 40p.
Proj. 1309, Task 130906
ASD TMR3 2 Unclassified report

Descriptors: (*Air force equipment, Environmental tests), (*Environmental tests, Electronic equipment), Compatibility, Aircraft equipment, Damage, Test equipment, Power supplies, Vibration, Simulation, Test methods, Temperature, Pressure, Shock (Mechanics), High altitude, Instrumentation.

Effort was made to determine whether combinations of natural and induced environmental conditions would produce debilitating or desirable effects different from those resulting from singly applied environmental tests. The program consisted of five phases: (1) an evaluation and analysis of standard single-environment test procedures applicable to a selected item of Air Force electronic equipment, (2) the performance of burn-in and base-line-reference tests, i.e., tests to determine performance data for comparison purposes, (3) the performance of natural and induced single-environment tests beyond design level to determine damage threshold, (4) the development of a test program consisting of tests which simulate combinations of those environments applicable to the selected test item, and (5) test trials to determine the effect of the combined-environment tests as compared to the effect of the single-environment tests. Data are limited to the specific item tested and to the time periods utilized in the test procedure; however, some observations on the design of combined-environment tests and desirable characteristics in a test item are also included. (Author)

AD-429 085 Div. 30, 2
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMPUTER PROGRAMS FOR PROCESSING SIGNALS RECEIVED IN RADAR ASTRONOMY EXPERIMENTS,
by P. L. Fleck, Jr. and T. J. Goblick, Jr.
16 Aug 63, 28p. Rept. no. 6464
Contract AF19 628 500
Unclassified report

Descriptors: (*Data, Radar), (*Radar, Data processing systems), Radar signals, Digital computers, Magnetic tape, Detection, Radar reflections, Radar receivers, Operation, Punched cards, Coding, Frequency, Test methods.

AD-429 094 Div. 30, 8
OTS price $15.00

Hughes Aircraft Co., Culver City, Calif.
COMPUTER RELIABILITY STUDY.
Summary technical rept. Oct 62-Sep 63.
Sep 63, 219p. Rept. no. P63 59
Contract AF04 695 210
Unclassified report

Descriptors: (*Computers, Reliability), Control systems, Compatibility, Errors, Bibliographies.

A report is presented concerning reliability synthesis techniques which are based upon the unique characteristics of control computers as opposed to those of data processors, and which are realizable with present-day computer construction technology. These techniques are based on the assumptions that control systems can tolerate some wrong stimulations from the control computer, but cannot tolerate long down-time, and that degradations in computer capability can be tolerated. These assumptions allow for the use of software, in addition to hardware, for the generation of the reliability synthesis techniques, and thus minimize the hardware penalty commonly associated with hardware only techniques (redundancy). However, due to the use of software in these techniques which are applied at the subsystem level, there is generally a degradation in accuracy of computation and/or computational capability which is associated with the occurrence of each failure. (Author)

AD-429 105 Div. 30
OTS price $38.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASURING INSTRUMENTS FOR THERMAL PROCESSES (Teplotekhnicheskiye Izmeritel'Nyye Pribory),
by K. A. Mironov and L. I. Shipetin. 7 Oct 63, 1023p.
FTD TT63 16 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury, pp. 1-898, 1958.

Descriptors: (*Handbooks, Measuring devices) (*Measuring devices, Handbooks), Design, Instrumentation, Operation, Thermometers, Thermocouples, Thermostats, Pyrometers, Potentiometers, Ionization gages, Thermal switches, Flowmeters, Pressure gages, Manometers, Hygrometers, Meters, Gas analysis, Valves, Measurement, Translations, Resistance thermometers, Radiation pyrometers, Liquid level gages, Borometers, Temperature sensitive elements.

The fundamental characteristics, external connections, and over-all dimensions of instruments for measuring temperature, pressure, quantity and rate of flow of liquids, gases, and vapors, and liquid levels are given. There is also a discussion of devices used to measure the compositions of liquids and gases, and the densities and moisture contents of gases. The book is designed for engineers and technicians engaged in the design, installation, and operation of devices used to monitor and regulate thermal processes in various industries. The book may also prove useful for students in higher educational institutions and higher technical educational institutions for both course work and diploma projects. (Author)

AD-429 107 Div. 30, 28
OTS price $3.60

RAND Corp., Santa Monica, Calif.
A NET TO SIMULATE MORSE-CODE LEARNING,
by Irwin Barr. Jan 64, 33p. Rept. no. RM3850PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Nerves, Nets), (*Bionics, Nerve cells), (*Learning, Simulation), Anatomical models, Models (Simulations), Coding, Memory.

The design of a neural net which can learn and recall six letters of Morse Code is presented. The net, called MCN, can learn these coded equivalents in any order. By cascading the MCN with a sequence-recall net, a new net is created, called I, which is able to encode words after being taught the individual letter codes. The method of combining these two nets and a modification of the referenced sequence-recall net are also discussed. (Author)

AD-429 125 Div. 30
OTS price $.50

Research Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE USE OF TRUE FOCUSING TECHNIQUES WITH THE X-RAY DIFFRACTOMETER.
Rept. for Jan-Oct 63,
by William L. Baun and David W. Fischer. Dec 63, 13p.
Proj. 7360, Task 736005
RTD TDR63 4194 Unclassified report

Descriptors: (*Refractometers, X-ray diffraction analysis), (*X-ray diffraction cameras, Operation), Attachment, Spectrum analyzers, Focusing, Diffraction, Instrumentation.

A suggestion that it should be possible to use true focusing geometry in the X-ray diffractometer was proved valid by the construction of such an attachment based on the geometry of the Seemann-Bohlin camera. A prototype model of this attachment measures only back reflection lines since the Bragg angle theta is derived from the original 2 theta angle recorded by the diffractometer by the relation 2 theta = theta + 90 degrees. Advantages of true focusing techniques are discussed, and several design alternatives are presented. (Author)

AD-429 158 Div. 30, 22
OTS price $2.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
APPLICATION AND EVALUATION OF A DIGITAL COMPUTER PROGRAM FOR INTERIOR BALLISTICS,
by Stuart Levy and Forrest McMains. Jan 64, 17p.
AED TM1291 Unclassified report

Descriptors: (*Interior ballistics, Programming (Computers)), (*Programming (Computers), Interior ballistics), Digital computers, Guns, Howitzers, Projectiles, Propellants, Mathematical analysis, Velocity.

A study was made to compare simulated firing results -- obtained from a digital computer program -- with actual firing data from eight weapon systems, the 75mm Howitzer, M1A1, M3; 76mm Gun, M1, M1A2; 90mm Gun, M41; 105mm Howitzer, XM103E; 105mm Gun, M68; 155mm Howitzer, M2; 175mm Gun, M113 and 8-Inch Howitzer, M2. This program will be valuable in estimating charges and velocities for new weapon systems. Many hours of laborious written calculations may be eliminated and solutions obtained in a shorter time by using two IBM Data Cards and about two minutes of machine time. (Author)

AD-429 180 Div. 30, 25
OTS price $2.60

Lexington Labs., Inc., Cambridge, Mass.
INVESTIGATION OF HIGH TEMPERATURE THERMAL EXPANSION DEVICES AND DESIGN OF A UNIT FOR USE WITH THERMAL IMAGE HEATING.
Final rept.,
by Robert C. Folweiler and Philip S. Schaffer. 15 Dec 63, 21p.
Contract AF19 628 1616, Proj. 5634, Task 563404
AFCRL 63 591 Unclassified report

Descriptors: (*Electric arcs, Images), (*Laboratory furnaces, Instrumentation), Thermal expansion, Oxides, Aluminum compounds, Zirconium compounds, High-temperature research, Transition temperature, Xenon lamps, Optical instruments, Micrometers.

The double clamshell arc imaging system has been successfully applied in a practical arrangement for physical property measurements. Thermal expansion measurements of alumina and zircon have been made to 1950 K (1670 C). An inflection in slope of the thermal expansion of zircon was observed at 1570 K indicating a possible phase transition previously unreported. Simple modifications (coating of mirrors) will provide higher temperatures (calculated at 2260 K). Electrical property measurements can be made in the field-free environment. (Author)

AD-429 239 Div. 30
OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
INSTRUMENTS FOR MEASUREMENT OF DUSTY AIRBLAST EFFECTS IN HIGH OVERPRESSURE REGIONS.
Final rept.,
by T. D. Witherly. Sep 63, 55p.
Contract DA49 146XZ024, SRI Proj. PHU3108
DASA 1433 Unclassified report

Report on Phase 5.

Descriptors: (*Instrumentation, Dust storms), Design, Pressure gages, Models (Simulations), Drag, Shear stresses, Particle size, Theory, Calibration, Sensitivity, Strain gages, Analog computers, Tracks (Aerodynamics), Measurement.

Instrumentation has been developed for the measurement of dynamic pressures and drag forces in high velocity, high pressure airstreams which are laden with dust. The instruments are intended specifically for the high overpressure regions (up to 500 psi) during atmospheric tests of nuclear weapons over desert surfaces. The research program included the design and construction of: (1) four total pressure probes (SRI-MAD gages) capable of measuring almost independently the total pressure of the gas phase and the momentum flux of the suspended dust, (2) four total drag probes to measure directly the drag force on a cylinder, (3) four dust sampling devices to obtain representative samples of suspended dust for particle size distribution analyses and (4) a surface shear gage to measure the magnitude of airblast induced shear stresses in the soil. (Author)

AD-429 281 Div. 30, 32
OTS price $4.60

ITT Communication Systems Inc., Paramus, N. J.
VARIABLE LENGTH INFORMATION PROCESSING PROGRAM.
Final rept.,
by I. L. Isert. 11 Sep 61, 1v.
Contract AF19 626 5, Task A1141 0245
ESD TDR63 685 Unclassified report

Descriptors: (*Data processing systems, Digital computer), (*Research program administration, Data processing systems), Coding, Punched card, Design, Maintenance, Reports, Input-output devices.

AD-429 283 Div. 30
OTS price $3.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
RESEARCH AND DEVELOPMENT REPORT,
by J. Reed. 5 Dec 63, 25p.
Proj. A438; SR0011 01 01
Unclassified report

Descriptors: (*Vibration, Transducers), Velocity, Acceleration, Calibration, High frequencies, Strain gages, Dynamics, Resolution, Microscopes, Interferometers, Stroboscopes, Instrumentation.

Recently, because of advances in the quieting of Naval machinery, it has become necessary to measure low level vibrations. This necessitates the calibration of the vibration transducers at low vibration levels from the low frequencies through a large frequency range. At the Naval Boiler and Turbine Laboratory, a displacement device using strain gages was designed and adapted to a shake table to measure its dynamic displacement. It was used successfully to calibrate a velocity transducer and an accelerometer at low vibration levels through an appreciable frequency range (down to 3.51 x 10 to the -6th cm single amplitude displacement, frequencies ranging from 5-150 cps). Because this high output device is used for measuring dynamic displacement and has a flat frequency response down to D.C., it inherently possesses very suitable characteristics for low frequency and low vibration level calibration of vibration transducers. It is superior to the interferometer method for measuring dynamic displacements because it utilizes strain gages which have infinite resolution. (Author)

AD-429 297 Div. 30, 7
OTS price $1.10

Purdue Research Foundation, Lafayette, Ind.
ADAPTIVE AND SELF-OPTIMIZING CONTROL.
Annual summary rept., 1 Feb 63-1 Feb 64,
by Rufus Oldenburger. 1 Feb 64, 5p.
Contract Nonr110020 Proj. NR049 167
Unclassified report

Descriptors: (*Adaptive control systems, Operations research), Mathematical analysis, Theory.

31. SHIPS AND MARINE EQUIPMENT

AD-428 491 Div. 31, 9
OTS price $1.60

David Taylor Model Basin, Washington, D. C.
MOTIONS OF A CONVERTED T-2 TANKER USNS MISSION CAPISTRANO (TAG 162),
by Frederick W. Palmer, Jr. Dec 63, 13p.
Proj. S F013 03 01
DTMB 1790 Unclassified report

Descriptors: (*Tankers, Motion), Tests, Ocean waves, Ship structural components, Measurement, Stresses, Instrumentation, Statistical analysis, Roll, Pitch (Motion).

The results are presented of motions experienced in heavy seas by a T-2 tanker modified by removal of a section of the ship structure to provide a large vertical well. Measurements are analyzed in a statistical manner. Comparison is made with an unmodified T-2 tanker. (Author)

AD-428 492 Div. 31, 9
OTS price $6.60

David Taylor Model Basin, Washington, D. C.
A METHOD FOR COMPUTING THE RESPONSE OF A SHIP TO A TRANSIENT FORCE,
by John N. Andrews. Nov 63, 59p.
Proj. S F013 03 01
DTMB 1544 Unclassified report

Descriptors: (*Ships, Water waves), (*Water waves, Ships), Transients, Elasticity, Hydrodynamics, Hydrostatic pressure, Hulls (Marine), Digital computers, Theory, Tests, Time, Momentum, Velocity, Analysis, Buoyancy.

A method for determining the elastic body response of a ship to a seaway is presented. The ship is divided into 20 equi-length sections. The force, generated by the seaway, which acts on the ship is computed for each of the 21 stations. The force is considered to consist of two parts, i.e., an unsteady hydrodynamic force, obtained from the measured rigid body motions, and a hydrostatic force. The force and mass-elastic parameters representing the hull are used as input quantities on the digital computer to obtain the response. The computer response is compared with the experimental response in order to evaluate the adequacy of the theory employed. It is believed that the computed response gives a good representation of the actual ship response obtained during full-scale trials. (Author)

AD-428 735 Div. 31, 9
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
THE ORDINARY WAVE-INDUCED RESPONSES OF A VICTORY CARGO SHIP,
by Nathan K. Bales. Dec 63, 37p.
DTMB 1734 Unclassified report

Descriptors: (*Cargo ships, Motion), Tests, Roll, Pitch (Motion), Statistical analysis, Stresses, Ocean waves.

The ordinary wave-induced midship vertical bending stress and the pitching, rolling, and heaving motions of a Victory cargo ship are presented. Short-term, long-term, and maximum-value statistical analyses are described. Considerable detail is given in regard to the maximum-value analysis. The results of the three analyses are discussed, and predictions of anticipated stress, bending moment, and motion magnitudes are given for this type of ship in the North Atlantic. (Author)

AD-429 223 Div. 31
OTS price $2.60

Naval Research Lab., Washington, D. C.
VELOCITY METER CORRECTIONS.
Interim rept.,
by G. J. O'Hara and P. F. Cunniff. Dec 63, 21p.
NRL MR1459 Unclassified report

Descriptors: (*Velocity, Meters), (*Meters, Velocity), Equations, Motion, Integral equations, Vibration, Damping, Transients, Transducers, Acceleration, Calibration, Equations of state.

The operation of the velocity meter for recording both steady state vibrations and transient responses is described. For the case of steady state vibrations the desirable characteristics of the velocity meter are presented for optimum performance. A correction equation is derived for finding the true base motion from velocity meter records of transient responses. This equation is applicable for any type of meter response, for records containing bottomings, and any non-linear characteristics of the meter which are mathematically describable. An example problem of a linearly damped meter is solved analytically by means of the correction equations for a known foundation motion. This same example is solved by the NAREC computer which has been programmed to correct velocity meter records. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-428 423 Div. 32
OTS price $7.60

Dayton U. Research Inst., Ohio.
ESTABLISHMENT OF A COORDINATE INDEXING RETRIEVAL SYSTEM FOR THE AIR FORCE MATERIALS LABORATORY.
Final summary rept., 1 Dec 60-30 Nov 63,
by Edward A. Janning. Nov 63, 71p.
Contract AF33 616 7698, Proj. 7381, Task 738105
RTD TDR63 4263 Unclassified report

Descriptors: (*Subject indexing, Military publications), (*Documentation, Subject indexing), Vocabulary, Data processing systems, Information retrieval, Computers, Scientific personnel, Training, Magnetic tape, Programming (Computers), Dictionaries, Input-output devices, Chemistry, Chemical compounds, Metallurgy, Physics.

A coordinate indexing system for a library containing over 10,000 documents has been established for the Air Force Materials Laboratory. The primary feature of this system is the ability to conduct either manual or computer searches. Manual searches are made using a dual dictionary that has been prepared by the University's NCR 304 computer. A thesaurus of over 18,000 multidisciplinary terms for this system has also been prepared. This report discusses in detail the indexing of documents using deep indexing with links and roles, the procedure used in editing the generated vocabulary, and, the various machine operations used in mechanizing the system. Briefly discussed are various studies made, or in the planning stage, to evalute several aspects of the system; in particular, an evaluation of the use of links and roles in the retrieval of information. (Author)

AD-428 584 Div. 32, 18
OTS price $5.60

RAND Corp., Santa Monica, Calif.
CONFLICTS IN SOVIET PARTY-MILITARY RELATIONS. 1962-1963,
by Roman Kolkowicz, Aug 63, 49p. Memo. no. RM3760PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Military organizations, Armed forces (Foreign)), (*Communisim, Military organization), Analysis, Military strategy, Social communication, Political science, Armed forces (United States), Leadership, Nuclear weapons, Foreign policy, United States government, National defense.

The purpose of this Memorandum, which has been prepared from open sources, is to describe and analyze a recent phase of the perennial conflict between the Soviet Communist Party leadership and some sectors of the Soviet military establishment. The basic issues of the conflict are: (1) resistance by officers who emphasize the importance of conventional forces to the strategic formulas announced by Khrushchev in January 1960, which discriminate against their interests; and (2) a concerted effort by the Party to force its views on the military through intensified political controls and intimidation. The study stresses the effect of the Cuban crisis on this ongoing conflict of interests, which seems to have exacerbated. (Author)

AD-428 595 Div. 32
OTS price $2.60

System Development Corp., Santa Monica, Calif.
IDENTIFYING KEY CONTRIBUTIONS TO INFORMATION SCIENCE,
by Carlos A. Cuadra. 10 Dec 63, 23p. Rept. no. SP1467
Unclassified report

Descriptors: (*Documentation, Information retrieval), (*Information retrieval, Reports), (*Personnel, Information retrieval), Textbooks, Periodicals, Bibliographies.

Several alternative approaches were examined to determine how one might identify some of the key (written) contributions to 'information science'. The advice of experts provides some assistance, if one is prepared to cope with their differing value systems, and reliance on current textbooks can also be helpful, prodived it is recognized that they show very considerable variation in point of view, subject coverage and in the selection of references. The unclear selective patterns in current bibliographies in the information science field also present problems. It is suggested that in identifying key contributions we are far from common agreement on the conceptual, methodological or practical contributions to the information science field. It is concluded that further study is underway on additional approaches, using citation indexing and retrospective appraisals by authors. (Author)

AD-428 912 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE ''UNNECESSARY'' RIFT IN NATO,
by E. Vandevanter, Jr. Dec 63, 23p. Rept. no. P 2841
Unclassified report

Descriptors: (*Military organizations, Foreign policy), Theory, Strategic warfare, Operations research.

Frictions in the NATO coalition should surprise no one. Alliance have habitually been short-lived and fraught with dissension -- as a matter of fact, NATO has already established some sort of record for integration and longevity. Still, NATO partners, true to form, have wrangled continually among themselves and disagreed with the recommendations of the corporate organization. The latest schism, however, introduces a new species of discord: a rivalry between corporate agencies within the alliance machinery itself. According to observers, a feeling of resentment-possibly even animosity-has grown up between the military and political elements of the central institution. (Author)

AD-428 948 Div. 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE DIFFERENCES IN SOVIET PORTRAYAL OF THEIR AID TO UNDERDEVELOPED COUNTRIES IN ENGLISH AND IN RUSSIAN,
by Nadia Derkach. Jan 64, 9p. Rept. no. P2853
Unclassified report

Descriptors: (*Political science, Propaganda), Communism, Economics, Public relations, Reviews, Foreign policy.

A comparative analysis is presented of the English and the Russian version of a Soviet book on aid to underdeveloped countries. The former was written for Asian and Middle Eastern readers, and the latter, for Soviet readers. (Author)

AD-429 014 Div. 32
OTS price $9.10

General Electric Co., Santa Barbara, Calif.
INTERNATIONAL STABILITY PROBLEMS AND PROSPECTS.
Feb 61, 196p. Rept. no. R6OTMP90
Unclassified report

Descriptors: (*National defense, Stability), (*Armed forces (Foreign), Stability), Military strategy, Political science, Nuclear weapons, War potential, Economics, Economic warfare, Population, Armament, Communist, Leadership, Communism, Survival, Life expectancy, Tables, Education, Nuclear warfare.

International relationships over the past decade have been conducted in the uneasy atmosphere of a delicate balance of thermonuclear terror and social revolution in the underdeveloped areas of the world. These two aspects of the international scene will probably persist over the foreseeable future. Future threats to international political and military stability will include the following: rapidly growing populations and revolutionary movements in underdeveloped areas of the world; severe strains which the underdeveloped areas will exert on the maintenance of the nation-state system as a consequence of the dramatic increase in the number of nation-states, the ineffectual sovereignties of many of these states, and the impact of social change arising from modernization; tensions which will continue to derive from relationships between underdeveloped countries, between these countries and the advanced powers, and between the advanced powers over these countries; the international diffusion of nuclear weapons; weapons developments which will tend to upset the delicate balance of terror and/or require split-second commitments to be effective. (Author)

AD-429 098 Div. 32
OTS price $4.60

Western Reserve U., Cleveland, Ohio.
MATHEMATICAL FORMULATION OF BASIC PROCEDURES IN DOCUMENTATION,
by James W. Perry and William Goffman. 13 Apr 60, 50p.
Contract AF49 638 357
AFOSR TN60 366 Unclassified report

Report on Theory of Documentation and Strategy of Searching.

Descriptors: (*Documentation, Theory) (*Computer logic, Documentation), Information retrieval, Subject indexing, Coding, Abstracts, Manned, Automation, Programming (Computers), Decision making, Mathematical logic, Computers, Design.

Certain basic aspects of documentation, especially the relationship of a ''message'' to alternate means for its expression and recording were studied. Attention was also directed to various documentation processes in which the message remains invariant, though the symbolism for expressing it may be greatly altered. In considering mathematical formulation, this led to such concepts as the message as a set, which may find expression in an equivalence class of sets, each of which is a version of a given message. The concept of set, in turn, led us to such concepts as sets of sets, sub-sets, and irreducible sub-sets-also sometimes called ''unit elements.'' The concepts of mapping and inverse mapping were also shown to be directly involved when dealing with such equivalence classes. These concepts are of essential importance for considering in a uniform and rigorous manner a very wide range of documentation processes ranging from translating from one natural language to another to alphabetical indexing, encoding for machine searching, and abstracting, performed either by people or by programmed machines. (Author)

AD-429 106 Div. 32
OTS price $9.10

RAND Corp., Santa Monica, Calif.
ECONOMICS DEPARTMENT PUBLICATIONS, 1958-1963: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
by Harriett Porch. Jan 64, 1v. Rept. no. RM 2800 1, suppl.
Unclassified report

Rept. no. RM-2800-1, Suppl. to rept. no. RM-2800-1, dtd Oct 62, AD-267 167.

Descriptors: (*Economics, Documentation), Abstracts, Operations research, Indexes, Textbooks, National defense, Water supplies, Scientific research, Foreign policy, Communism, Growth, Theory, Military organizations, Wages, Military requirements, Research program administration.

AD-429 111 Div. 32
OTS price $3.60

RAND Corp., Santa Monica, Calif.
NONMILITARY SECRECY UNDER SOVIET LAW,
by Peter Maggs. Jan 64, 35p. Rept. no. P2856
Unclassified report

Descriptors: (*Secret communication, Control), (*Communism, Crimnology), (*Secret communication, Military publications), Communists, Textbooks, Periodicals, Military intelligence, Economics, Propaganda, Television communication, Motion pictures, Radio communication systems, Public opinion

AD-429 227 Div. 32, 17, 25
OTS price $1.60

California U., Berkeley.
RESEARCH INVESTIGATIONS CONDUCTED UNDER THE PROVISIONS OF CONTRACT NONR22267, PROJECT NR036 031.
Final summary rept.,
by I. Cornet. Dec 63, 13p. Technical rept. no. 8
Contract Nonr22267, Proj. NR036 041
Unclassified report

Descriptors: (*Scientific research, Bibliographies), (*Bibliographies, Scientific research), (*Fatigue (Mechanics), Abstracts), (*Corrosion, Abstracts), Single crystals, Magnesium compounds, Oxides, Deformation, Electron microscopy, Mechanics, Copper, Pipes, Aluminum, Corrosive liquids, Laminar flow, Temperature, Metallurgy, Deflection, Electrochemistry.

AD-429 242 Div. 32
OTS price $.75

Harry Diamond Lab., Washington, D. C.
THE MEDIUM-SIZED INFORMATION SERVICE; ITS AUTOMATION FOR RETRIEVAL,
by Berthold Altmann. 30 Dec 63, 26p.
HDL Proj. 01200
HDL TR1192 Unclassified report

Descriptors: (*Documentation, Automation), Data, Theory, Management engineering, Information retrieval, Computer, Data processing systems, Subject indexing, Catalogs, Reports.

A theoretical discussion of the basic elements influencing the organization and operation of a documentation office (the type of information, the clientele, the personnel, and the tools and machines) is followed by a case study. The operations of a medium-size reference service were automated first by utilizing EAM equipment; later a computer. In the process, the coordinate indexing system was replaced by the ABC (Approach-By-Concept) system, permitting manual as well as automatic retrieval. Possible application of this system to large documentation centers is explained. (Author)

33. TRANSPORTATION

AD-428 668 Div. 33, 11
OTS price $11.50

RAND Corp., Santa Monica, Calif.
PERFORMANCE OF LAND TRANSPORTATION VEHICLES,
by R. H. Haase and W. H. T. Holden. Jan 64, 20p. RM3966RC

Unclassified report

Descriptors: (*Transporation, Urban areas), (*Vehicles, Transporation), Equations, Motion, Acceleration, Velocity, Time, Ranges (Distance), Drag, Railroads, Mathematical analysis, Propulsion, Passenger vehicles, Roads, Effectiveness, Operations research, Performance (Engineering), Effectiveness.

This study subdivided the technology of transportation into the following five categories: (1) vehicles; (2) propulsion systems; (3) right-of-way and allied structures; (4) storage and maintenance facilities; and (5) control systems. The general approach is to consider these five categories as the physical building blocks of any transportation system, to evaluate and describe each component in terms of extant and developing technological and economic pressures, to reshape each component into the form it will probably have in the foreseeable future, and to reconstruct possible transportation systems of the future by rebuilding with the blocks which evolve from the foregoing procedures. The performance of land transportation systems and the derived equations of motion are based on an analysis of vehicle-propulsion system combinations. Equations of motion for vehicle-propulsion system combinations are developed by considering the movement of a land transportation vehicle as linear motion of a rigid body. The relationship between automation and effective speed can be evaluated. A design engineer can use the derived equations to estimate acceleration characteristics and maximum speed for a given vehicle-propulsion system combination. (Author)

AD-428 997 Div. 33, 18, 23
OTS price $4.60

Battelle Memorial Inst., Columbus, Ohio.
THE UTILIZATION OF GROUND-EFFECT MACHINES IN THE MOBILITY OF THE ARMY.
Final rept.,
by James P. Loomis and Ralph G. Dale, Jr. Jan 61, 40p.
DA Proj. TC51

Unclassified report

Descriptors: (*Ground effect machines, Mobile), (*Logistics, Transportation), (*Operators (Personnel), Effectiveness), Maintenance, Operation, Terrain, Mathematical analysis, Water, Lift, Stability, Control.

This report concludes a study to determine the feasibility of utilizing the ground-effect machine to improve Army mobility. The present efforts in research and development, and the expected operational problems are discussed in determining the capabilities and limitations of such vehicles. A discussion of generalized Army transportation requirements is presented. The application of ground-effect machines to meet these requirements is the final topic covered in the report. The conclusions arrived at in this study indicate that ground-effect machines have a potential application as large intercontinental vehicles to provide a logistic support force. The potential of ground-effect vehicles in overland operations will be limited without some form of terrain preparation. (Author)

AD-429 326 Div. 33
OTS price $12.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF THE EFFECTS OF AIR TRAFFIC OPERATING AT SEVERAL PROPOSED JETPORTS UPON THE AIR TRAFFIC CONTROL SYSTEM.
Final rept.,
by H. Slattery, D. Bottomley, G. Jolitz, H. Rohland and S. Rossiter. May 63, 1v.
Proj. 101 134 00V

Unclassified report

Original contains color plates: all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Air traffic, Site selection), (*Civil aviation, Site selection), Jet planes, Urban areas, Simulation, Airports, Compatibility, Air traffic control systems, Data, Tables.

A new jetport had been proposed to serve the New York metropolitan area, to be operational by 1968. Three proposed sites were submitted for evaluation. One basic route structure and traffic flow pattern was evaluated for each site condition. Modifications were made during exploratory runs to improve flows and procedures. The results of the simulation indicated that the air traffic control problems generated by any of the three jetport sites would be complex and would generally arise due to crossings of heavily used arrival and departure routes with those of the major airports in the area. The airspace requirements for handling the traffic flows for any of the three sites would necessitate changes to the boundaries of established warning and restricted areas, or jurisdiction of airspace of other control facilities. The traffic flow pattern analysis indicated there would be no overall appreciable differences in the demand upon the system by air traffic under the various site conditions. (Author)

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NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

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AGRICULTURE

TID-18794
Florida Agricultural Experiment Station, Gainesville.
MUTATION RESEARCH WITH GAMMA RADIATION AT A SPECIFIC LOCUS IN A HIGHER PLANT
A. T. Wallace. 14 Apr 63, 39p
Contract AT(40-1)2562
OTS $3.60

DESCRIPTORS: *Mutations, *Oats, *Genetics *Gamma rays.

TID-18936
Interamerican Inst. of Agricultural Sciences, Turrialba (Costa Rica)
THE APPLICATION OF NUCLEAR ENERGY TO AGRICULTURE Annual rept.
Carl C. Moh. 1 Jul 63, 62p
Contract AT(30-1)2043
OTS $6.60

DESCRIPTORS: *Mutations, *Sulfur, *Iron, *Bacteria, *Insects.

ASTRONOMY

Astrophysics

NASA-CR-9
Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY III: DETERMINATION OF ATMOSPHERIC PARAMETERS BY THE USE OF ROCKET-BORNE MASS SPECTROMETERS
R. F. K. Herzog, F. F. Marmo, R. A. Minzner, and G. O. Sauermann. Sep 63, 42p
Contract NASw-395
CGA-TR-62-2-N; N64-11233, Previously announced as N62-16683
OTS $1.00

BEHAVIORAL SCIENCES

Human Engineering

AD-420 577
Aerospace Medical Research Labs. (6570th), Aerospace Medical Div., Wright-Patterson AFB, Ohio
DEFINING "LEVEL-OF-AUTOMATION" FOR CHECK-OUT EQUIPMENT: A SCALING APPROACH. Final rept.
Donald A. Topmiller. Aug 63, 20p
AMRL-TDR-63-76
OTS $0.75

DESCRIPTORS: *Human engineering, *Checkout equipment, *Automation, Psychology.

In an attempt to determine if different professional groups use differing subjective scales for defining "level of automation" of checkout equipment, 19 engineering psychologists and 19 design engineers were administered a paired-comparisons judgment task consisting of cards containing phrases indicating various levels of man-machine automation. The resulting scaled responses for both groups contained rank-order inversions of an original intuitively developed scale. Intervals between scale points also differed between the groups. As a result of these findings, if Air Force requirements are specified for automation level of checkout equipment in weapon systems development programs, the type of raters involved and the associated potential problems of interdisciplinary communications between professions should be considered. (Author)

NASA-TN-D-2065
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
MINIMUM CREW SPACE HABITABILITY FOR THE LUNAR MISSION
George A. Rathert, Jr., Norman M. McFadden, Richard F. Weick, R. Mark Patton, and Glen W. Stinnett. Feb 64, 64p
N64-14519
OTS $1.75

AD-420 353
Aerospace Medical Research Labs. (6570th), Aerospace Medical Div., Wright-Patterson AFB, Ohio
VOLUMETRIC WORKSPACE STUDY. PART I. OPTIMUM WORKSPACE CONFIGURATION FOR USING VARIOUS SCREWDRIVERS
William N. Kama. Aug 63, 36p
AMRL-TDR-63-68(I); N63-22682
OTS $1.00

DESCRIPTORS: *Job analysis, *Performance tests, *Maintenance, *Screwdrivers, Industrial psychology

The effect of various workspace configurations upon subject performance in removing and installing a component (transformer) using various screwdrivers was investigated. Subjects performed the task under 15 different workspace configurations and with the transformer placed in 3 different orientations with respect to the aperture. The different workspace configurations were achieved by combining 5 different aperture sizes (8, 10, 12, 14, and 16 inches) and 3 different depths (6, 12, and 18 inches). Major results of this study (within the range of conditions explored) are: (a) Work time decreased as aperture size increased. However, increasing aperture size above 10 to 12 inches did not appreciably shorten work time. (b) Increasing the depth of the component within the workspace resulted in longer work time. However, work time increased appreciably only at depths in excess of 12 inches. (c) Component orientation with respect to the aperture was an important determinant of performance. Work time increased as orientation changed from straight-line access (back) to a right-angle access (bottom and side). (Author)

Psychology

PB-165 137
Naval School of Aviation Medicine, Pensacola, Fla.
THE SENTENCE-COMPLETION TEST AS A MEASURE OF MORALE
Warren W. Willingham. 12 Mar 58, 20p
Proj. NM 16 01 11, rept. no. 4
OTS $1.60

DESCRIPTORS: *Attitudes, *Psychometrics, Personality, Military psychology, Aviation personnel.

The sentence-completion technique was evaluated as a measure of the generalized, non-specific attitude toward the work situation. Five morale tests were administered to 164 naval aviation cadets. The intercorrelations were consistent with the assumption of one general factor. The average intercorrelations indicated that no one test was superior in measuring the general factor. (Author)

BIOLOGICAL SCIENCES

PB-165 120
Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
PROCEDURE FOR LAMINATING ONE PIECE SHOULDER DISARTICULATION TYPE PROSTHESIS (POROUS)
Chester T. Shelton, 19 Mar 59, 5p
Technical rept. no. 5919; AD-212 659
OTS $1.10

DESCRIPTORS: *Prosthetics, *Laminates, Porous materials, Arms, Joints (Physiology).

BNL-6996
Brookhaven National Lab., Upton, N. Y.
THE FINE STRUCTURE OF THE MOUSE ADENOHYPOPHYSIS IN VARIOUS PHYSIOLOGICAL STATES
Barbara G. Barnes. [1963] 39p Prepared in cooperation with Cavendish Lab., Univ. of Cambridge
Contract AT(30-2)GEN-16
OTS $3.60

DESCRIPTORS: *Pituitary hormones, *Pituitary gland

PB-165 119
Naval Biological Lab., Univ. of California, Oakland.
DETECTION OF AIRBORNE MICRORGANISMS THROUGH THEIR UNIQUE COMPOUNDS. Special rept. no. 16
H. Wolochow, comp. 15 Jan 59, 28p
Contract N7onr-295(36)
AD-211 170
OTS $2.60

DESCRIPTORS: *Bacterial aerosols, Microorganisms, Chemical analysis, Carboxylic acids.

A literature survey disclosed a number of compounds which are unique to microorganisms. Dipicolinic acid, diaminopimelic acid, muramic acid, polyhydroxybutyric acid, D-amino acids and chitin were thus selected. The occurrence, distribution, assay and function of these compounds is described and discussed. It has been proposed that detection of such compounds in airborne particulate matter would disclose the presence of microorganisms. This proposal is examined in the light of some basic problems in BW detection. It was concluded that successful use of these compounds in rapid detection of airborne BW agents will depend on development of qualitative techniques applicable to amounts of microbial mass much smaller than are now useable in current analytical chemical methods, as well as on the applicability of automation to such techniques. (Author)

Anatomy and Physiology

AD-419 729
Arctic Aeromedical Lab., Fort Wainwright, Alaska
ALTERATIONS OF RAT TISSUE CYTOCHROME C LEVELS BY A CHRONIC COLD EXPOSURE
George J. Klain. Jun 63, 7p
AAL-TDR-63-6; N63-22716
OTS $0.50

DESCRIPTORS: *Tissues (Biology), Rats, Cytochemistry, *Exposure, *Cytochromes, Cells (Biology), *Acclimatization, Adaptation (Physiology).

The levels of cytochrome c were measured in various tissues from rats that had been exposed to cold (5° C) for 1 to 20 weeks. At the end of four weeks of cold exposure the cytochrome c levels of the heart, kidney, liver, lung, skeletal muscle and the spleen were increased by 43.7, 29.4, 131.6, 61.8, 140.6 and 61.2 per cent, respectively, over the control animals maintained at an ambient temperature of 25° C. Thereafter, the levels remained increased throughout the whole 5 month experimental period. (Author)

AD-419 817
Arctic Aeromedical Lab., Fort Wainwright, Alaska
EFFECTS OF PARTIAL COLD WATER IMMERSION ON MAN IN THE ARCTIC
James H. Veghte. Jun 63, 14p
AAL-TDR-63-24; N63-22768
OTS $0.50

DESCRIPTORS: *Exposure, *Acclimatization, *Polar regions, Body temperature, Blood circulation, Legs.

Experiments were conducted to determine how critical a hazard to man partial cold water immersion would be during the Arctic winter and how long a time would be available before frostbite could be expected. At ambient temperatures ranging from -2° to -45° F, subject's right leg was immersed to the knee in water for 10 seconds, after which the subject either stood at rest or exercised. Twenty-four skin temperature measurements were recorded every two minutes, and experiments were terminated when any skin temperature reached 40°F. Data indicate that footgear should not be removed after accidental partial cold water immersion and that, even with no activity, a person has approximately 30 minutes before any danger of frostbite occurs. Exercising or walking greatly prolongs tolerance time and, even at very low temperatures, one may walk for hours before the foot temperature becomes dangerously low. (Author)

PB-165 127
Army Medical Research Lab., Fort Knox, Ky.
COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN. I. ABSOLUTE IDENTIFICATION OF STIMULUS INTENSITY LEVEL
Glenn R. Hawkes and Joel S. Warm. 16 Sep 59, 22p
Rept. no. 400; AD-228 937
OTS $2.60

DESCRIPTORS: *Skin, *Sensory mechanisms, Stimulation, Communication systems, Communication theory, Electric currents, Vibration.

Usefulness of current intensity level as a cue for signaling purposes was investigated. Intensity levels were equally spaced in terms of apparent magnitude of sensation. Subjects could identify two levels without error, with maximum transmission of information being achieved with use of about three levels. More information was transmitted when a.c. was presented at 1500 cps than at 100 cps. Intensity level could be useful as a cue in an electrical cutaneous communication system. (Author)

AD-421 567
Army Aeromedical Research Unit, Fort Rucker, Ala.
NOISE PROBLEMS ASSOCIATED WITH THE OPERATION OF US ARMY AIRCRAFT
Jimmy L. Hatfield and Donald C. Gasaway. Jun 63, 146p
USAARU rept. no. 63-1
OTS $2.75

DESCRIPTORS: *Noise, *Airplane engine noise, Hazards, Deafness, Hearing, *Autiometry, Aviation personnel, *Aviation medicine, Control, Ear, *Acoustics, Protective clothing.

This report describes and illustrates basic, as well as unique, characteristics of noise associated with the operation of Army aircraft. It summarizes the important facts relative to hazardous noise, its effects on man, the characteristics of noise generators, noise reduction concepts, and future noise problems. The purpose is to alert aviation medical officers, flight surgeons, and physicians in the Army to this problem, and provide guidance in those circumstances where a problem of potentially hazardous noise exists. (Author)

PB-165 138
Naval School of Aviation Medicine, Pensacola, Fla.
THE RELATIONSHIP OF AROUSAL MEASURES TO SUBSEQUENT BEHAVIOR. I. GROUP ESTIMATES OF INDIVIDUAL STRESS SUSCEPTIBILITY
Alexander A. Longo and Richard E. Doll. 18 Apr 62, 12p
Proj. MR005.13-3003, rept. no. 1
OTS $1.60

DESCRIPTORS: *Stress (Physiology), *Behavior, Tolerances (Physiology), Pain, Aviation personnel, Selection

The relationship between physiological arousal measures taken under three physically threatening conditions and ratings of stress susceptibility was investigated. Consistency in arousal response was also examined. The arousal measures are designated as changes in pulse and blink rate under threat of physical pain. Stress susceptibility is defined as over-reactivity to threat of impending physical pain as estimated by peer ratings. The results indicated a significant relationship between one blink rate measure and ratings of stress susceptibility, and a partial interstress and intermeasure consistency of response to physical threat. The use of muscular tension measures (e.g., blink rate) for predictive purposes appears to have potential value. (Author)

Biochemistry

AD-419 728
Arctic Aeromedical Lab., Fort Wainwright, Alaska
SOME METABOLIC EFFECTS OF METHIONINE TOXICITY IN THE RAT
G. J. Klain, D. A. Vaughan, and Lucile N. Vaughan. Jun 63, 12p
AAL-TDR-63-5; N63-22715
OTS $0.50

DESCRIPTORS: Metabolism, Toxicity, *Methionine, Rats, *Glycines, *Liver, *Transaminases, Fats, Amino acids.

Rats consuming a 15% casein diet containing 4.0% of DL methionine developed the following metabolic alterations in the liver: increased activities of arginase, tryptophan pyrrolase, glutamic-oxalacetic and pyruvic transaminase, decreased levels of DPN and slightly increased levels of total and neutral fat. However, the fat content approached a normal level at the end of the tenth week of the experimental period. Urinary excretion of a number of amino acids was also markedly increased. Supplementation of the high methionine diet with 4.0% of glycine decreased the activity of arginase and the levels of some amino acids in the urine. The data indicate that ingestion of excess methionine leads to a disorder in nitrogen metabolism, and that the supplemented glycine diminishes these catabolic processes. (Author)

AD-420 631
Armed Forces Inst. of Pathology, Washington, D. C.
DETERMINATION OF CARBOXYHEMOGLOBIN IN DECOMPOSED BODIES. Final rept.
Abel M. Dominguez, James R. Halstead, and Thaddeus J. Domanski. Jul 63, 19p
MIPR(33-657)2-RD-175
AMRL-TDR-63-69
OTS $0.50

DESCRIPTORS: *Body, *Carbon compounds, * *Monoxides, *Hemoglobin, Decomposition, Blood, Tissues (Biology), Chromatographic analysis, Histological techniques.

This study is concerned with the interpretation and the significance of carbon monoxide findings in cases associated with decomposition. The evidence presented indicates that the percentage of carboxyhemoglobin saturation value is not markedly altered during postmortem decomposition when: (1) The specimens are properly preserved, and (2) the blood extracted from tissue is examined as soon as possible for the presence of carbon monoxide. It appears possible to obtain carbon monoxide values, utilizing blood extracted from tissue, in the presence of postmortem decomposition that are similar to the antemortem levels. Within the

4% to 12% carboxyhemoglobin-saturation range covered in this study, there was neither a marked increase nor decrease in final percentage of carboxyhemoglobin following decomposition. Unreliable carboxyhemoglobin saturation values may occur, and the possible contributory factors responsible for a spurious increase in carboxyhemoglobin values are discussed along with corrective measures. A gas-solid chromatographic procedure for determining carbon monoxide using blood or tissue is presented. (Author)

TID-18778
Georgia Univ., Athens.
KINETICS OF HYDROGEN TRANSFER BETWEEN HYPOXANTHINE AND DIMETHYLBIACRIDYLIUM NITRATE IN THE PRESENCE OF CHICK LIVER XANTHINE DEHYDROGENASE
Washington J. De Angelis and John R. Totter. [1963], 27p
Contract AT(40-1)2851
OTS $2.60

NYO-10583
Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.
ABSORPTION OF VITAMIN B_{12} AND IF ACTIVITY.
Final rept. for period ending 15 Mar 62.
Bacon F. Chow. 15 Mar 62, 15p
Contract AT(30-1)1203
OTS $1.60

TID-18798
Tennessee Univ., Knoxville.
BIOSYNTHESIS, ISOLATION, AND METABOLISM OF CARBON-14 LABELED γ-HYDROXYGLUTAMIC ACID IN TWO SPECIES OF PHLOX Master's thesis.
Benjamin Porter Stone. Jun 61, 42p
Contract AT(40-1)2574
OTS $4.60

TID-18797
Tennessee Univ., Knoxville.
C-14 BIOSYNTHESES, ISOLATION, AND METABOLISM OF γ-METHYL, γ-HYDROXYGLUTAMIC ACID IN ADIANTUM PEDATUM
James Richard Azzi. Master's thesis. Mar 63, 27p
Contract AT(40-1)2574
OTS $2.60

TID-18796
Tennessee Univ., Knoxville.
A STUDY OF THE NITROGEN AND CARBOHYDRATE METABOLISM OF UREIDE PRODUCING PLANTS ESPECIALLY CANAVALIA ENSIFORMIS (THE JACKBEAN) USING C-14 AND N-15 LABELED SUBSTRATES
[Gordon E. Hunt] [1963] 37p
Contract AT(40-1)2574
OTS $3.60

AD-420 364
Winifred Masterson Burke Relief Foundation, White Plains, N. Y.
PROTEIN NUTRITIONAL INDIVIDUALITY. I. METHODS. Final rept.
Anthony A. Albanese. Aug 63, 74p
Contract AF33(616)7356
AMRL-TDR-63-77; N63-22901
OTS $2.00

DESCRIPTORS: *Proteins, *Nutrition, Amino acids, Metabolism, *Blood proteins, Nitrogen, Chromatographic analysis, Histological techniques.

The practical and fundamental shortcomings of the nitrogen-balance method as a means of ascertaining protein and specific amino acid requirements of humans find ample support in the literature, and emphasize the need for a more flexible, rapid, and economical procedure. A familiarity with factors involved in the mechanism and route through which proteins and amino acids are metabolized would undoubtedly help in evaluating protein and amino acid needs of man under various physiological and pathological conditions. Inasmuch as the literature indicates that blood amino acids reflect the size and qualitative characteristics of the amino acid pool, the available chemical, radiochemical, and chromatographic procedures for determining amino acids in body fluids were carefully considered. Of these, the quantitation of paper chromatographic measurements of amino acids proved to be the most practical in terms of sample size, rapidity, and convenience of analysis. The report indicates that procedures developed are suitable for metabolic studies concerned with determination of nutritional individuality. (Author)

Pathology

BNL-7015
Brookhaven National Lab., Upton, N. Y.
INCORPORATION OF TRITIATED NUCLEOSIDES AND AMINO ACIDS INTO LYMPHOID AND PLASMOCYTOID CELLS DURING SECONDARY RESPONSE TO TETANUS TOXOID IN MICE
H. Cottier, N. Odartchenko, G. Keiser, M. Hess, and R. D. Stoner. 7 May 63, 29p
Contract AT(30-2)GEN-16
OTS $2.60

AD-419 987
Bryn Mawr Coll., Pa.
VIRULENCE AS A FACTOR IN SALMONELLA INFECTION IN MICE MAINTAINED IN THE COLD
G. J. Miraglia and L. J. Berry. Jun 62, 19p
Contract AF41(657)340
AAL-TDR-62-7; N63-21400
OTS $0.50

DESCRIPTORS: *Salmonella, *Staphylococcus, *Mice, Hypothermia, Toxins and antitoxins, Iron compounds, Oxides.

A study was made to determine possible differences in the course of salmonellosis in mice maintained at 25° C and others kept at 5° C, and to uncover, if possible, mechanisms responsible for such differences. An intravenous injection of 0.1 ml of saccharated iron oxide(Proferrin) two hours prior to infection lowers the LD_{50} to 4.9×10^3 and 4.0×10^1 for mice kept respectively at 25° C and 5° C. Low environmental temperature and "blockage" of the reticuloendothelial system (RES) lowered the resistance of mice to about the same degree, but low temperature and RES impairment together lowered resistance as if each were acting independently. Doubling the volume of Proferrin more than double the change in susceptibility to infection manifested by the mice but this amount seems to be toxic for mice. Even more important is

the incidence of staphylococci found in liver or kidney of mice infected with S. typhimurium and kept at 5°C. Cultures were made on animals that survived infection for a period of 14 days and, except for the largest challenge doses where only a few animals remained, the incidence of staphylococci was proportional to the number of salmonellae injected. At 25°C only a small percentage of mice have staphylococci in tissues and these occur independent of the infectious dose of salmonellae. (Author)

AD-420 966
Tufts Univ., Boston, Mass. School of Medicine.
METABOLISM OF IRON IN DISEASES OF THE LIVER. Annual rept. 1 Oct 61-1 Oct 63
Thomas C. Chalmers and Mortimer S. Greenberg. 1 Oct 63, 109p
Contract DA49-193-md-2248
OTS $2.50

DESCRIPTORS: *Metabolism, *Iron, *Liver, Diseases, Rats, Reticuloendothelial system, Absorption (Biological),

Studies of the mechanism and kinetics of iron absorption in the rat by the measurement of body radioactivity after intragastric administration of Fe^{59} and in the dog by infusion of Fe^{59} into surgically isolated segments of jejunum indicate that there are hyperbolic relationships between amount of iron absorbed and amount of iron given and also between rate of absorption and concentration of iron in the intestinal lumen. Although it was not possible to saturate the iron absorbing apparatus in these ways, absorption of iron from small intragastric doses was transiently blocked by the prior administration of large doses in rats. Acute alteration of reticuloendothelial system functional activity did not influence absorption of iron in rats. By means of a 4 lumen 2 balloon intestinal tube to isolate an intestinal segment it was possible both to measure rate of iron absorption in man and to study the role of intraluminal factors. Mean rate of iron abosrption of patients with cirrhosis was greater than that of normal volunteer prisoners; 0.83 ± 0.14 (S. E.) and 0.33 ± 0.06 µg/min respectively. Both intra- and extra-luminal factors influenced this enhanced iron absorption in patients with liver disease. (Author)

Pharmacology and Toxicology

TID-18004
New York Univ., N. Y. Coll. of Engineering.
THE DISTRIBUTION OF URANIUM IN THE HUMAN BODY (PARTS I, II, III). Final rept.
J. Tomsky, M. A. Woodbury, and Monroe L. Norden. Dec 62, 123p
Contract AT(30-1)2518
OTS $9.60

DESCRIPTORS: *Uranium, *Excretion

TID-18840
Washington Univ., Seattle.
QUANTITATION OF GOLD IN URINE BY NEUTRON ACTIVATION AND COMPUTER GAMMA RAY SPECTRUM ANALYSIS
John Burton Dietzman. 1963, 46p
OTS $4.60

Radiobiology

TID-18954
Baylor Univ., Waco, Tex.
COMPLETE SCIENTIFIC REPORT [ON BIOLOGICALLY ESTIMATING EXPOSURE OF ANIMALS TO WHOLE BODY IONIZING IRRADIATION]. [1963] 9p
Contract AT(40-1)2913
OTS $1.10

DESCRIPTORS: *Immunity, *Radiation effects, *Rats.

BNL-6960
Brookhaven National Lab., Upton, N. Y.
A MATHEMATICAL MODEL FOR THE DISTRIBUTION OF LENGTHS OF CHROMOSOMAL DEFICIENCIES INVOLVING A SPECIFIC LOCUS
K. H. Thompson. 18 Jun 63, 13p Prepared in cooperation with Cornell Univ.
Contract AT(30-2)GEN-16
OTS $1.60

DESCRIPTORS: *Genetics, *Chromosomes.

HW-SA-3050
Hanford Atomic Products Operation, Richland, Wash.
RADIOECOLOGICAL STUDIES OF NORTHERN ALASKA
W. C. Hanson, D. G. Watson, W. H. Rickard, and J. J. Davis. 17 May 63, 10p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Alaska, *Ecology, *Radiobiology.

TID-18722
International Atomic Energy Agency, Vienna (Austria)
DOSIMETRY IN HUMAN RADIOEPIDEMIOLOGY WITH SPECIAL REFERENCE TO SKELETAL DOSE RATES IN THOROTRAST CASES. Progress rept. no. 2. [1962] 6p
Contract AT(30-1)2819
OTS $1.10

DESCRIPTORS: *Thorium, *Oxides, Bibliographies, *Health physics

UCRL-10979
Lawrence Radiation Lab., Univ. of California, Berkeley.
ANALYSIS OF X-RAY-INDUCED MITOTIC DELAY IN SEA URCHIN EGGS
Bhashini Rao. Doctoral thesis. 20 Aug 63, 66p
Contract W7405-eng-48
OTS $1.50

MMPP-196-2
Michigan Memorial Pheonix Proj., Univ. of Michigan, Ann Arbor.
WAVELENGTH-DEPENDENT EFFECTS OF LOW-ENERGY X-RAYS ON MAMMALIAN TISSUE CELLS
Walter Frederick Wegst, Jr. Doctoral thesis. 25 Jun 63, 177p
Contract AT(11-1)1205
ORA-5222-1-T
OTS $12.50

DESCRIPTORS: *Mammals, *Cell (Biology), *Radiation effects

TID-18855
North Carolina Univ., Chapel Hill.
STUDIES OF MUTATION AND OF RECOMBINATION IN THE SAME CHROMOSOMES OF IRRADIATED FEMALE DROSOPHILA MELANOGASTER. Final rept. 1 Feb 54-31 Mar 63.
Maurice Whittinghill. [1963] 34p
Contract AT(40-1)1740
OTS $3.60

DESCRIPTORS: *Radiation effects, *Drosophilidae, *Genetics

TID-18980
Philadelphia General Hospital, Pa.
THE EFFECT OF X-RAY IRRADIATION ON THE LIPIDS OF THE SKIN. Progress rept. for 1 Oct 62-30 Jun 63
Henry P. Schwarz. [1963] 17p
Contract AT(30-1)1864
OTS $1.60

DESCRIPTORS: *Phospholipids, *X-rays, *Microsomes, *Radiation effects, *Liver.

TID-18792
Rockefeller Inst. for Medical Research, New York.
BIOLOGICAL RESEARCH. Progress rept. for 1 Oct 62-1 Jun 63
Theodosius Dobzhansky. [1963] 11p
Contract AT(30-1)3096
OTS $1.60

DESCRIPTORS: *Radiation effects, *Genetics, *Drosophilidae.

TID-18992
Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
QUANTITATIVE POPULATION GENETICS OF MICE UNDER IRRADIATION. Progress rept. for 1 Jul 62-30 Jun 63
Earl L. Green, Thomas H. Roderick, and Gunther Schlager. 24 Jun 63, 14p
Contract AT(30-1)1979
OTS $1.60

DESCRIPTORS: *Mice, *Radiation effects, *Population, *Genetics.

TID-18846
Southwestern Medical School, Univ. of Texas, Dallas.
NUCLEOLAR RESPONSES TO IONIZING IRRADIATION
P. O'B Montgomery, D. H. Karney, and R. C. Reynolds. 19 Jun 63, 8p
Contract AT(40-1)2478
OTS $1.10

DESCRIPTORS: *Liver, *Radiation effects, *Nuclei (Biology).

COO-227
Utah Univ., Salt Lake City, Coll. of Medicine.
RESEARCH IN RADIOBIOLOGY. Annual rept. on the Chronic Toxicity Program.
Thomas F. Dougherty. 31 Mar 63, 240p
Contract AT(11-1)119
OTS $15.50
DESCRIPTORS: *Radium, *Radiobiology, *Toxicity

NAA-SR-MEMO-7426
Atomics International, Canoga Park, Calif.
AN EVALUATION OF CONDENSED POLYCYCLIC COOLANT
M. A. Rotheram. 20 May 63, 32p
Contract AT(11-1)GEN-8
OTS $3.60

DESCRIPTORS: *Reactor coolants.

TID-18985
Institute for the Study of Rate Processes, Univ. of Utah, Salt Lake City.
THE ELECTROCHEMISTRY OF A TWO-DIMENSIONAL HYDROGEN GAS. Technical rept. no. 62
Vernon Glen LeFebre, Carl J. Christensen, and Henry Eyring. 21 May 63, 103p
Contract AT(11-1)1144
OTS $9.10

DESCRIPTORS: *Electrochemistry, *Nickel, *Palladium, *Electrodes, *Hydrogen.

TID-16285
Kansas Univ., Lawrence.
OPERATIONAL AMPLIFIER CIRCUITS FOR CONTROLLED POTENTIAL CYCLIC VOLTAMMETRY
John R. Alden, James Q. Chambers, and Ralph N. Adams. 20 Feb 63, 15p
Contract [AT(11-1)686]
OTS $1.60

DESCRIPTORS: *Circuits, *Voltmeters, *Ammeters.

UCRL-10840
Lawrence Radiation Lab., Univ. of California, Berkeley.
SOME REACTIONS OF DIPHOSPHORUS TETRACHLORIDE
Charles B. Lindahl and William L. Jolly. May 63, 10p
Contract W7405-eng-48
OTS $1.10

UCRL-7301-T
Lawrence Radiation Lab., Univ. of California, Livermore.
HEATS OF EXPLOSION OF UNSTABLE GASEOUS HYDRIDES
Stuart R. Gunn. [1962] 10p
Contract W7405-eng-48
OTS $1.10

DESCRIPTORS: *Hydrides, *Heat of reaction.

LADC-5790
Los Alamos Scientific Lab., N. Mex.
USE AND CALIBRATION OF A GAS CHROMATOGRAPH FOR GAS ANALYSIS AT THE PROJECT ROVER TEST FACILITY
D. H. Liebenberg, and F. I. Edeskuty. 12 Jun 63, 15p
Contract W7405-eng-36
OTS $1.60

DESCRIPTORS: *Hydrogen, *Nitrogen, *Oxygen, *Gas chromatography.

NYO-10551
Massachusetts Inst. of Tech., Cambridge
A MOLECULAR ORBITAL TREATMENT OF THE BONDING IN CERTAIN METAL-ATOM CLUSTERS
F. A. Cotton and T. E. Haas. 16 Jul 63, 30p
Contract AT(30-1)1965
OTS $2.60

DESCRIPTORS: *Chemical bonds.

IDO-11005
Monsanto Research Corp., Dayton, Ohio.
ORGANIC COOLANT ESSENTIAL DATA. Quarterly rept. no. 7, 1 Jan-31 Mar 63.
J. A. Ellard, C. D. King, W. J. Moodie, and W. H. Yanko. 18 Apr 63, 8p
Contract AT(10-1)1088
OTS $1.10

DESCRIPTORS: *Reactor coolants, Heat transfer.

NYO-10590
New Hampshire Univ., Durham
DISPLACEMENT AND EXCHANGE REACTIONS INVOLVING ORGANOMETALLIC COMPOUNDS. Annual progress rept.
Henry G. Kuivila. 1 Jan 63, 7p
Contract AT(30-1)2970
OTS $1.10

TID-18983
Pennsylvania State Univ., University Park.
EFFECT OF RADIATION ON DYNAMIC PROPERTIES OF HIGH POLYMERS. Progress rept. Jul 62-Jun 63.
J. A. Sauer. Jul 63, 15p
Contract AT(30-1)1858
OTS $1.60

DESCRIPTORS: *Polymers, *Radiation effects

TID-17823
Pennsylvania State Univ., University Park.
ELECTROCHEMISTRY AND THERMOCHEMISTRY IN FUSED SALTS. Annual progress rept. 16 Aug 61-31 Dec 62.
Joseph Jordan. 10 Jan 63, 33p
Contract AT(30-1)2133
OTS $3.60

DESCRIPTORS: *Nitrates, *Chromium, *Chromates, *Electrochemistry,

TID-18921
Physics Engineering Chemistry Corp., Boulder, Colo.
THE SPECTRUM, THE EXCITATION AND IONIZATION CROSS-SECTIONS FOR PHOTO PROCESSES AND FOR COLLISIONS, OF FIVE TIMES IONIZED OXYGEN. Quarterly rept. no. 8, 1 Mar-31 May 63
Carlos M. Varsavsky. [1963] 58p
Contract AT(11-1)1017
OTS $5.60

DESCRIPTORS: *Oxygen, *Ionization.

TID-18766
Pittsburgh Univ., Pa.
STUDIES OF ALLOY FORMATION. Annual rept. for 15 May 62-15 May 63.
W. E. Wallace. 15 May 63, 34p
Contract AT(30-1)647
OTS $3.60

DESCRIPTORS: *Rare earths, *Hydrides, *Nitrides, *Alloys.

NYO-6006
Princeton Univ., N. J.
COAGULATION OF COLLOIDAL GOLD
B. V. Enuestuen and John Turkevich. 1 Jun 63, 53p
Contract AT(30-1)1301
OTS $5.60

NYO-9696
Rensselaer Polytechnic Inst., Troy, N. Y.
SURVEY OF NON-AQUEOUS CONDUCTANCE DATA. Technical rept. no. 8.
George J. Janz, F. J. Kelly, and H. V. Venkatasetty. Dec 62, 54p
Contract AT(30-1)1999
OTS $5.60

DESCRIPTORS: *Bibliographies, *Electrolytes.

TID-17635
Stanford Research Inst., Menlo Park, Calif.
SORPTION OF GASES ON METAL SURFACES IN ULTRAHIGH VACUUM. Quarterly progress rept. no. 3, 15 Aug-15 Nov 62. 28 Nov 62, 11p
Contract AT(04-3)425
SRI Proj. no. PAU-3994
OTS $1.60

DESCRIPTORS: *Metal films, *Gases, *Sorption,

TID-18976
Vanderbilt Univ., Nashville, Tenn. Graduate School.
THE ABSORPTION OF SOUND IN METHANE-D_2
Louis Raymond Dragonette. Master's thesis. Jun 63, 59p
OTS $5.60

DESCRIPTORS: *Deuterated compounds, *Methanes, *Acetylenes, *Ethylenes.

TID-18654
Wetherill Chemistry Labs., Purdue Univ., Lafayette, Ind.
CHEMISTRY OF POLYVALENT METAL HALIDES. Technical progress rept. for 1 Mar 62-28 Feb 63.
Herbert C. Brown and Sang Up Choi [1963], 37p
Contract AT(11-1)170
OTS $3.60

AD-426 952 repriced
Harry Diamond Labs., Washington, D. C.
FLOW-THROUGH POROUS ELECTRODES FOR REDOX COUPLES
David Singman and A. P. Bond. 4 Oct 63, 29p
TR-1163
OTS $0.75

DESCRIPTORS: *Oxidation-reduction reactions, *Electrodes, Porous materials, Carbon, Titanium compounds, Polarization, Fuel cells, *Electrochemistry.

Investigation of the electrochemical behavior of the Ti^{+++} - TiO^{++} and Br_2 - Br^- couples was continued with polarization measurements at porous flow-through electrodes. Porous carbon was found to be an effective electrode material. Carbons with an average pore diameter of 0.001 to 0.002 in. were superior in performance to those with larger pores. Incorporation of a small amount of platinum or iridium metal in the porous carbon resulted in a marked decrease in electrode polarization. Samples of porous tantalum and titanium were considerably inferior to carbon in electrode behavior, while porous platinum gave excellent results. Complete cells were constructed and evaluated with results very close to those expected on the basis of single-electrode measurements. (Author)

AD-424 577
Naval Research Lab., Washington, D. C.
THE SOLUBILITY OF ALKALI-METAL DINONYLNAPHTHALENE SULFONATES IN VARIOUS TYPES OF SOLVENT, AND A THEORY OF THE SOLUBILITY OF OIL-SOLUBLE SOAPS. Interim rept.
R. C. Little and C. R. Singleterry. 11 Nov 63, 26p
NRL rept. 6010; N64-12832
OTS $0.75

DESCRIPTORS: *Surface-active substances, *Soaps, Solubility, Theory, *Metallic soaps, Alkali metal compounds, *Lithium compounds, *Sodium compounds, *Cesium compounds, *Naphthalenes, *Sulfonates, Solvents,

The solubility of the alkali-metal (group I) dinonylnaphthalene sulfonates in low-polarity solvents is roughly parallel to that of dinonylnaphthalene in the same solvents. This indicates that, to a first approximation, the outer hydrocarbon sheath of the micelle determines compatibility with a solvent. In systems showing limited solubility the data indicate that (a) the condensed soap phase behaves as an extremely viscous liquid and (b) the equilibrium is characteristic of a liquid/liquid system in which the limited solubility of the two components in each other increases with rising temperature to a critical solution temperature; above this temperature the soap and solvent are miscible in all proportions. In solvents having Hildebrand parameters above 10, the solvent, with a few exceptions, appears to associate with the monomer (or dimer) solute molecule to modify the latter's solubility parameter and to maintain high solubility of the sulfonate as an equilibrium mixture of monomer, dimer, and possibly higher units. Pure crystalline alkali-metal carboxylates do not show high solubility in hydrocarbons unless they are heated to a temperature at which they pass over to a liquid-like phase; noncrystalline carboxylates, or mixed crystals of many different branched chain carboxylate species, have high or unlimited solubilities and appear to behave as liquid/liquid systems. (Author)

AD-420 944
Naval Research Lab., Washington, D. C.
STUDIES OF PORTABLE AIR-OPERATED AEROSOL GENERATORS
W. H. Echols and J. A. Young. 26 Jul 63, 19p
NRL rept. 5929; N63-23170
OTS $0.50

DESCRIPTORS: *Aerosol generators, Portable, Design, *Atomization, *Spray nozzles, Jets, Particle size, Distribution, Liquid filters.

Four simple, portable, air-operated aerosol generators have been developed by NRL. These generators are used to produce polydisperse liquid aerosols. Model I is a small-capacity single-nozzle generator with a jet impactor. Model II is a multinozzle generator of larger capacity without a jet impactor. Model III is an improved single-nozzle generator with a larger capacity than Model I. The Model III has a jet impactor and produces a smaller average particle size than Models I and II. Model IV has a different slit-type nozzle which produces a greater quantity of aerosol at the same airflow and with approximately the same average particle size. The only requirements for operation of the aerosol generators are on adequate, filtered, and well-regulated compressed air supply and the liquid to be disseminated. When DOP (di(2-ethylhexyl)-phthalate) is used as the liquid, the dispersed phase of the aerosol system has a light-scattering geometric mean diameter of the magnitude of one-half micron. Other suitable liquids, either compounds or mixtures, may be disseminated with these generators provided the liquid used is chemically inert to the materials of the generators. (Author)

AD-420 959
Nottingham Univ. (England)
PHYSICAL AND CHEMICAL PROPERTIES OF ANHYDROUS METAL NITRATES. Annual technical rept., 1 Jun 62-30 May 63
C. C. Addison. 30 Jun 63, 38p
Contract DA91-591-EUC-2389
OTS $1.00

DESCRIPTORS: *Complex compounds, Metallic compounds, *Copper compounds, *Beryllium compounds, *Lead compounds, *Tin compounds, *Nitrates, Acetates, Molecular structure, Crystal structure, Spectra (Infrared).

The crystal structure of the adhydrous 1:1 complex of copper nitrate with nitromethane was determined, and the report gives a full description of the structure. Since basic beryllium nitrate is one of the clearest examples of bridge-bonding by the nitrate group, it was considered important to determine the infra-red spectrum in the gaseous state, thus eliminating any complications arising from lattice forces and distortions. The hot cell used is described, and the spectra obtained are presented and discussed. Attention was also given to the chemistry of compounds in which the nitrate group is bonded covalently in molecules which also contain acetate or alkyl groups. The reactions of lead IV and tin IV acetates with dinitrogen tetroxide give acetate-nitrates as intermediate or final products. These reactions are discussed in the light of the oxidising powers of the nitrate group in this environment, and the influence of the valency state of the metal. Reference is also made to the preparation and properties of dimethyl tin dinitrate. (Author)

PB-165 112
Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
SOLUTIONS FOR COMPLEX SYSTEMS OF CHEMICAL REACTION KINETICS: AN IRREVERSIBLE UNIMOLECULAR REACTION FOLLOWED BY A REVERSIBLE UNIMOLECULAR REACTION. Rept. no. 3 on Theoretical Foundations for Properties of High Temperature Gases
Dennis W. Kuba and Daniel D. Konowalow. Feb 63, 71p
Contract AF33(657)7311
ARL 63-44
OTS $7.60

DESCRIPTORS: *Reaction kinetics, Chemical reactions, *Gases, High temperature research, Equations.

The analytical solutions for the system $A \xrightarrow{k_1} B \underset{k_3}{\overset{k_2}{\rightleftharpoons}} C$ are explored for characteristic features which are useful to the kineticist in determining the rate constants from fragmentary experimental data. It is found that B exhibits a maximum whenever $k_3 < k_1$. This maximum and the time at which it occurs are among the most useful features in determining the rate constants. A critical examination of the pseudostationary state approximation for B as applied to this system is made, and a related approximation to C is introduced. The approximations are found to have a similar range of validity. The time at which C is at an arbitrary percent of its equilibrium concentration is studied. Under certain conditions this time is essentially independent of one or more of the rate constants. (Author)

PB-165 113
Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
SOLUTIONS FOR COMPLEX SYSTEMS OF CHEMICAL REACTION KINETICS. PART III: A REVERSIBLE UNIMOLECULAR REACTION FOLLOWED BY AN IRREVERSIBLE UNIMOLECULAR REACTION. Interim technical rept. 16 Sep 61-Apr 63, on Research in Chemical Energetics
Dennis W. Kuba and Daniel D. Konowalow. Jul 63, 69p
Contract AF33(657)7311
ARL 63-44, Part III
OTS $6.60

DESCRIPTORS: *Reaction kinetics, Chemical reactions, *Gases, High temperature research, Equations.

The integrated rate equations for the system $A \underset{k_4}{\overset{k_1}{\rightleftharpoons}} B \xrightarrow{k_2} C$ are explored for characteristic features which are useful in the determination of rate constants. Only systems with the initial conditions $A = A_0$, $B = 0$ and $C = 0$ at $t = 0$ are considered. Rate-determining processes for the overall reaction are found by treating a number of limiting cases in which one or more of the rate constants are small compared to others. The reaction is defined to be complete when $C/A_0 = 0.99$, and $t(0.99)$ is used as a reference time. The steady state hypothesis is invoked to obtain approximate expressions for the concentration of B and C. The two approximations are found to have somewhat similar ranges of validity. (Author)

PB-165 084
University of Southern California, Los Angeles.
PROPERTIES OF SOLUTIONS IN THE NEIGHBORHOOD OF THE CRITICAL TEMPERATURE OF THE SOLVENT. Technical rept. no. 3, 1 Feb 51-31 Jul 53
Sidney W. Benson, Charles S. Copeland, Peter E. M. Allen, James K. Fogo, and David Pearson. 15 Aug 53, 143p
Contract N6onr-238-11
AD-19 731 (including AD-19 732- AD-19 740)
OTS $11.00

DESCRIPTORS: *Solutions, *Solvents, *Phase studies, Temperature, Molecular properties, Enthalpy, Entropy, Pressure, *Electrical conductance, Steam, Dielectric properties, Volume, Graphic analysis, *Thermochemistry, *Sodium compounds, *Chlorides.

Included in the report are:
A phenomenological approach to the behavior of one and two-component systems in the vicinity of the critical point, by Sidney W. Benson and Charles S. Copeland, AD-19 732
A rectilinear diameter law of mole fractions for binary liquid-vapor coexistence regions near the critical locus, by Sidney W. Benson, Peter E. M. Allen, and Charles S. Copeland, AD-19 733
Molal volumes and compressibilities of the system NaCl-H_2O above the critical temperature of water, by Sidney W. Benson, Charles S. Copeland, and David Pearson, AD-19 734
The system NaCl-H_2O at supercritical temperatures and pressures, pub. in The Jnl. of Chemical Physics 21:12-16, Jan 53, AD-19 735
Entropies and enthalpies of transition in the system NaCl-H_2O at elevated temperatures and pressures, AD-19 736
Temperature-composition and pressure-composition diagrams, AD-19 737
The dielectric constant of supercritical steam, by James K. Fogo, Sidney W. Benson, and Charles S. Copeland. AD-19 738
A pressure counterbalancing apparatus for the measurement of the electrical conductivity of aqueous solutions above their critical temperatures, pub. in The Review of Scientific Instruments 22: 765-769, Oct 51, AD-19 740.

EARTH SCIENCES

PB-165 129
Air Force Cambridge Research Labs., Bedford, Mass.
A COMPENDIUM OF PAPERS IN THE FIELDS OF GEODESY AND PLANETARY GEOMETRY PREPARED AT AFCRL DURING 1962. Research rept.
Owen W. Williams, ed. Aug 63, 240p
AFCRL-63-876; N63-23301, includes N63-23302-23313
OTS $15.50

DESCRIPTORS: Reviews, *Geodesics, *Astronomical geodesics, *Geometry, *Scientific satellites, *Lasers, Triangulation, *Navigation satellites, Instrumentation, *Optical equipment, Numerical methods and procedures, *Position finding, Azimuth, Photogrammetry, Airborne, Gravimeters, *Selenography, *Air force research.

This Compendium presents a series of technical papers prepared by scientists of Air Force Cambridge Research Laboratories during 1962, in the fields of geodesy and planetary geometry. These papers describe

research activities in the areas of satellite geodesy (in particular Project ANNA), rocket-flare triangulation, airborne gravimetry, absolute and relative gravity, laser geodesy, and selenodesy. Illustrations show recent geodetic instrumentation developments and technique configuration. (Author)

PB-165 131
Air Force Cambridge Research Labs., Bedford, Mass.
FULL-FIELD SEISMIC MODELLING. Research note
Ker C. Thomson. Jun 63, 19p
AFCRL-63-685; N63-22468
OTS $1.60

DESCRIPTORS: *Seismic waves, *Mechanical waves, *Propagation, *Models (Simulations), Photoelasticity, Stroboscopes, Photographic analysis.

This report discusses a method of viewing and photographing the entire field of the stress wave simultaneously at all positions. Time dependence is obtained by sequential photography. Excitation of the model is produced by striking it repetitively with a small metal pin operated by the cam follower on a 14-inch flywheel rotating at 30 cps. The models are transparent, permitting visualization and quantitative representation of the wave through the photoelastic effect. The waves appear to stand still or to propagate through the use of stroboscopic illumination and a continuously variable phase relationship between striking and flashing, controllable by the observer. Simultaneous full-field viewing of models up to 16 inches in diameter is possible. Isochromatic and isoclinic photographs of propagating waves in a 12-inch-square model are shown. (Author)

TID-18986
Geological Survey, Denver, Colo.
PHYSICAL PROPERTIES OF TUFF IN CHAMBER AND WORKINGS OF U12q DRILL HOLE, RAINIER MESA, NEVADA TEST SITE
W. L. Emerick, D. L. Hoover, R. P. Snyder, and J. W. Hasler. 24 Jun 63, 20p
Tech. letter: AREA-12-9
OTS $1.60

PB-165 121
Northwestern Univ., Evanston, Ill.
LAKE MICHIGAN SHORE EROSION AND GEOMORPHOLOGY PROJECT. Summary rept. Nov 56-Nov 57 [1957] 10p
Contract Nonr-1228(07)
AD-146 034
OTS $1.10

DESCRIPTORS: *Great Lakes, *Beaches, *Erosion, Terrain, Lakes, Geology, Mapping, Aerial photographs, Surveying, Geography.

About 1300 notes and 508 beach and bluff samples were plotted on maps. Equipment and aerial photos were obtained. Section corners and quarter posts near Lake Michigan were identified on the aerial photos and listed for remeasurement to determine any change in the position of the shore since the original government surveys made between 1820 and 1840. Shorelines of Oconto and Door Counties in Michigan were mapped. Nearly 600 additional field notes were taken. About 180 samples of beach and bluff materials were collected. Approximately 145 distances from identifiable points to the Lake Michigan shore were resurveyed. The entire shoreline was examined mile by mile and the beach and backland codes were mapped in code. (Author)

NYO-10219
Parametrics, Inc., Waltham, Mass.
A FEASIBILITY STUDY OF RADIOLOGICAL MECHANISMS FOR USE IN GEOPHYSICAL RESEARCH.
Annual rept. Charles A. Ziegler, Leonard L. Bird, Paul B. Fredrickson, Richard H. Maehl, and Frederick Williams. 30 Oct 62, 163p
Contract AT(30-1)2938
OTS $12.00

DESCRIPTORS: *Waters, *Atmosphere, *Argon, *Nitorgen

Climatology and Meteorology

PB-165 154
Cloud Physics Lab., Univ. of Chicago, Ill.
THE CHEMICAL IDENTIFICATION OF SILVER IODIDE ICE NUCLEI
L. Randall Koenig. 15 Jun 59, 45p
Grant NSF-G4644
Technical note no. 19
OTS $4.60

DESCRIPTORS: *Silver compounds, *Iodides, *Nucleation, *Ice, Water, Crystallization, Laboratories, Chemical analysis

This report describes a method of chemically identifying silver iodide particles within ice crystals and discusses the results of this test on laboratory ice crystals nucleated by means of silver iodide. (Author)

PB-165 156
Cloud Physics Lab., Univ. of Chicago, Ill.
A CONDUCTOMETRIC APPARATUS FOR MEASUREMENT OF CLOUD LIQUID-WATER CONTENT
Earl W. Barrett and George V. Owens. Mar 57, 48p
Grant NSF-G2164
Technical note no. 6
OTS $4.60

DESCRIPTORS: *Measuring devices (Electrical and Electronic), *Meteorological instruments, Water, Clouds, Measurement, Design, Operation

The liquid-water measurement system consists of: (a) a porous-plug capillary collector; (b) a conductivity cell into which the collected cloud water is introduced; (c) a stirring system to insure prompt mixing of the collected water with the reagent; (d) a reagent for which the electrical conductivity varies considerably, monotonically and reproducibly with per cent of water added; (e) another conductivity cell with a cell constant approximately equal to that of the first, and which contains dry reagent; (f) electronic means for measuring and recording the ratio of the cell resistances independently of their absolute values; and (g) means for draining and refilling the cells and for charging the column between the capillary collector and the measuring cell with water. The various components of the system are described in detail. (Author)

PB-165 151
[Cloud Physics Lab] Univ. of Chicago, Ill.
HURRICANE CLOUD PHYSICS RESEARCH. Final rept
R. R. Braham, Jr. and E. A. Neil. 31 Jan 57, 75p
Contract Cwb-8714
OTS $7.60

DESCRIPTORS: *Tropical cyclones, *Meteorological phenomena, Clouds, *Hurricane tracking, Airplanes, Instrumentation, Meteorological instruments, Weather forecasting, Artificial precipitation, Meteorology.

Hurricane modification through cloud treatment is discussed as a method for reducing the intensity of hurricanes, preventing their formation, or causing them to follow paths of minimum possible damage. Assistance in basic instrumentation of Air Force airplanes which will be flown into hurricane areas is reviewed. The final two parts of this report are concerned with (1) a list of special equipments which were purchased for, or designed and constructed for, the U. S. Weather Bureau in connection with this research, and (2) with recommendations concerning the continuing role of Cloud Physics in the National Hurricane Research Project.

PB-165 158
[Cloud Physics Lab.] Univ. of Chicago, Ill.
HURRICANE CLOUD PHYSICS RESEARCH. Final rept., 1 Jul 57-30 Jun 59
R. R. Braham, Jr., ed. 15 Jun 60, 156p
Contracts Cwb-9175 and Cwb-9484; continuation of Contract Cwb-8714
OTS $11.50

DESCRIPTORS: *Tropical cyclones, *Meteorological phenomena, *Hurricane tracking, Artificial precipitation, Liquids, Water, Measurement, Weather forecasting, Atmospheric precipitation, Particles, Distribution, Clouds, Wind, Meteorological radar, Meteorology.

Topics includes: An airborne silver-iodide generator for seeding large-scale weather patterns; an exploratory experiment in hurricane seeding; liquid-water-content measurements in hurricanes; precipitation particle measurements in trade wind cumuli; precipitation-particle distribution in tropical storms, 1958; a cloud census of fair weather cumuli; and movement of radar echoes in the eye wall of hurricane daisy. (See also PB-165-151)

PB-165 150
[Cloud Physics Lab.] Univ. of Chicago, Ill.
HURRICANE CLOUD PHYSICS RESEARCH. Final rept., 1 Jul 59-30 Jun 60
B. Ackerman. 15 Mar 62, 71p
Contract Cwb-9720; continuation of Contract Cwb-9484
OTS $7.60

DESCRIPTORS: *Tropical cyclones, *Meteorological phenomena, *Hurricane tracking, Water, Clouds, Distribution, Measurement, Airplanes, Weather forecasting, Meteorology.

This report is concerned with the evaluation and analysis of cloud physics data collected by Hurricane Project aircraft during the 1957, 1958, and 1959 operational seasons. In particular, research interest was concentrated on the evaluation and analysis of liquid-water-content measurements and related data. (See also PB-165 158)

PB-165 152
Cloud Physics Lab., Univ. of Chicago, Ill.
ICE IN THE SUMMER ATMOSPHERE: AN INQUIRY INTO ITS STRUCTURE, GENESIS AND METAMORPHOSIS
L. Randall Koenig. 1 Jun 62, 187p
Grants NSF-G8214 and NSF-G8215
Technical note no. 24
OTS $13.00

DESCRIPTORS: *Ice, *Clouds, *Atmosphere, Phase studies, Water, Crystallization, Cumulus clouds, Cumulonimbus clouds, Laboratories, Tests

This report is based on an analysis of laboratory and field measurements pertaining to the solid water phase in the atmosphere. Particular emphasis is placed on the glaciating characteristics of cumulus clouds. It is concluded that ice particles in a cumulus cloud will be formed initially at the periphery of the cloud in regions of active entrainment. The interior of the cloud will not become glaciated until either the ice particles are large enough to fall through the updraft or the cloud becomes sufficiently high so that heterogeneous droplet freezing occurs. The irregular shapes and high concentrations of ice particles in cumulus clouds can be explained on the basis of ice particle multiplication by means of a process involving the production of satellite particles during the solidification of large liquid-water droplets. The glaciating characteristics of small cumulonimbus clouds are dependent upon the liquid size distribution present prior to glaciation. The ice solid-phase builds upon the size distribution previously established by the liquid phase; that is, the solid phase does not begin anew but a continuous modification of the hydrometeor size distribution occurs as a result of continued growth by accretion. (Author)

PB-165 153
Cloud Physics Lab., Univ. of Chicago, Ill.
A LABORATORY INVESTIGATION OF DROPLET FREEZING
Thomas E. Hoffer. Dec 60, 90p
Grants NSF-G4644 and NSE-G8215
Technical note no. 22
OTS $8.10

DESCRIPTORS: *Water, *Drops, *Freezing, Temperature, Ice, Freezing point depressants, Salts, Atmosphere, Laboratories

Laboratory experimentation was undertaken to investigate the effects of various soluble and insoluble nuclei on the freezing temperature of water droplets. Pure water was produced and was subsequently frozen in droplet form. The freezing temperatures of various sizes of pure water droplets were used as a reference standard for the other phases of the experiment. The experiment showed that soluble salts commonly found in the atmosphere decreased the freezing temperatures of the droplets in all cases. Insoluble nuclei increased the freezing temperatures of the droplets. The addition of soluble salts to water droplets containing insoluble nuclei caused a marked depression of the freezing point below that originally observed. The magnitude of the depression was found to be a function of the solute concentration. Certain aspects of the role of droplet freezing in the atmosphere are discussed by extending the experimental results to atmospheric processes. (Author)

PB-165 157
Cloud Physics Lab., Univ. of Chicago, Ill.
RESEARCH IN CHEMICAL COMPOSITION OF SOME FORMS OF ATMOSPHERIC PARTICLES
Ottavio Vittori. 15 Dec 56, 63p
Grants NIH RG-4521 and S-12(C)
Technical note no. 5
OTS $6.60

DESCRIPTORS: *Atmosphere, *Particles, Chemical properties, Collecting methods, Gels, Chemical reactions, Chemical analysis, Test methods, Tests

Procedures are developed for identifying the chemical composition and size of airborne particles. The basic technique involves the capture of the particles in a specially treated gel. Reagents in the gel produce a physico-chemical reaction known as the Liesegang reaction. The products of the reaction precipitate in the form of rings. Identification of the particles is made by one or more of three factors: the character of the pattern of the precipitate, the color of the precipitate, or its change of color. Tests are developed for particles containing the following substances: chlorides, soluble iodide, soluble sulfide, soluble ferrocyanide, soluble sulfates, nitrates, potassium ion, soluble silver, fluorides, lead and all heavy metals. Details are given for the preparation of the gels to be used for specific tests, and techniques for the capture of particles are discussed. A discussion is given of experiments conducted to study the production of sulfate particles by the burning of wood or coal. A technique for the capture of small water droplets and analysis of the salt which may be dissolved in them is described. (Author)

PB-165 155
Cloud Physics Lab., Univ. of Chicago, Ill.
SOME STUDIES OF TRACE MATERIALS IN THE ATMOSPHERE WITH SPECIAL EMPHASIS ON METHODS FOR CONCENTRATING TRITIUM IN SAMPLES OF NATURAL WATERS
Erik Eriksson. 1 Aug 58, 28p
Grants NIH-S-12(C) and NIH-S-12(C2)
Technical note no. 16
OTS $2.60

DESCRIPTORS: *Atmosphere, *Tritium, Tracer studies, Collecting methods, Thermal diffusion separation, Atmospheric motion

The work concerns some atmospheric circulation phenomena and their possible applications while another part is of a technical nature and concerns possible methods for enriching tritium in natural waters prior to analysis. Among the methods considered are thermal diffusion separation and separation by "wetted wall' distillations.

Physics of the Atmosphere

PB-165 130
New Mexico Univ., Albuquerque.
ON A SENSITIVE METHOD FOR THE RECORDING OF ATMOSPHERIC OZONE. Scientific rept. no. 1
Victor H. Regener. 21 Jul 60, 6p
Contract AF19(604)7211
AFCRL-263; AD-254 271
OTS $1.10; Pub. in Journal of Geophysical Research, 1960, v. 65, no. 12, p. 3975-3977

DESCRIPTORS: *Atmosphere, *Ozone, *Meteorological instruments, Recording systems, Radiosondes, Sensitivity, Luminescence, Materials, Design, Operation.

A device is described which uses the luminescence of a dry substance in the presence of ozone for the automatic quantitative determination of minute concentrations of atmospheric ozone. The sensitivity of the device is extremely high and the response is instantaneous. Since there are no liquid chemicals, the method can be used at extreme heights in the atmosphere, and it is equally applicable to the continuous monitoring of ozone near the earth's surface. (Author)

NYO-9854
Parametrics Inc., Waltham, Mass.
INVESTIGATION OF RADIOISOTOPE TECHNIQUES FOR ATMOSPHERIC DENSITY MEASUREMENTS AND THE DEVELOPMENT OF A DEVICE. Final technical rept.
Charles A. Ziegler, Leonard L. Bird, and Roy Rex.
12 Oct 62, 85p
Contract AT(30-1)2795
OTS $8.10

ENGINEERING

AD-297 806
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COMPENDIUM OF SYMPOSIUM PAPERS (1962). ANNUAL AIR FORCE SCIENCE AND ENGINEERING SYMPOSIUM (NO. 9) HELD AT BROOKS AIR FORCE BASE, SAN ANTONIO, TEXAS, 9-11 OCTOBER 1962.
Sep 62, 340p
ASD-TDR-62-718, Volume I
OTS $19.75

DESCRIPTORS: *Symposia, *Research program administration, *Spacecraft, Fluid mechanics, Bionics, Optics, Reports, Reviews, Air force research, Laminar flow, Deceleration.

This compendium (Vols I and II) contains 23 of the 29 papers presented at the ASD Science and Engineering Symposium. The following are the major subjects presented. Space Vehicles. Prediction techniques for determination of aerodynamic pressures for hypersonic glide vehicles. Discussions on attitude controls, crew escape techniques. The time duration that an Earth satellite is vulnerable to action by a ground based missile system. Sensors for surveillance of space vehicles. Aspects of radar camouflage and the impact of proton environment. Relative velocity measurements between two space vehicles using optical heterodyning. Warhead concepts for hard targets in space. Aspects of Laminar Flow Control. Design solutions to supersonic flow altitude flights. Performance of supersonic combustion ramjet engines. A technique for thrust measurement for electro-thermal rockets. Materials in Air Force Weaponry. Vapor plating thin film on tubular materials. Electric effects on fluid dynamics. Principles of residue class or modular arithmetic techniques. New types of computation subsystems. Helicopter-type Rotor Decelerators and Progress in Bionics including construction of generalized learning machine. (Author)

PB-165 104
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OPERATION OF AN F-106A IN THUNDERSTORMS AT SUPERSONIC AND HIGH SUBSONIC AIRSPEEDS.
Rept. for Apr-Jun 61, on High Level Thunderstorms
George P. Roys. Oct 61, 37p
ASD Technical note 61-97
OTS $3.60

DESCRIPTORS: *All-weather aviation, Thunderstorms, *Jet planes, *Flight testing, Supersonic flight, Subsonic characteristics.

An F-106A was flown through thunderstorms at supersonic and high subsonic speeds to measure power spectra of turbulence to wave-lengths of about 10,000 feet and to determine rigid-body response of a delta-wing aircraft. Liquid water, hail, and ice crystals encountered at high speed caused extensive damage to the aircraft. Rivets were broken, TACAN antenna was worn away, pieces were torn from the metal nose cone, and other components were damaged. (Author)

NASA-TN-D-1981
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
INVESTIGATION OF THE IMPACT OF COPPER FILAMENTS INTO ALUMINUM TARGETS AT VELOCITIES TO 16,000 FEET PER SECOND
C. Robert Nysmith, James L. Summers, and B. Pat Denardo. Feb 64, 12p
N64-14726
OTS $0.50.

NAA-SR-Memo-8162
Atomics International, Canoga Park, Calif.
AN IMPROVED METHOD OF SHOCK TESTING ON SHAKERS
R. M. Oliva and W. A. Hay. 9 Jan 63, 15p
Contract AT(11-1)GEN-8
OTS $1.60

PB-165 103
David Taylor Model Basin, Washington, D. C.
RECENT DEVELOPMENTS IN THE THEORY OF SHIP VIBRATION
R. T. McGoldrick, A. N. Gleyzal, R. L. Hess, and G. K. Hess, Jr. Feb 51, rev. Oct 53, 55p
Rept. 739
OTS $5.60

DESCRIPTORS: *Ship hulls, *Vibration, Theory, Equations of motions, Difference equations.

It is shown that by considering the ship hull as a floating beam having shearing and bending flexibility with a distributed viscous damping proportional to mass it is possible to derive equations of motion under external forces by the general Rayleigh method which yields a solution in terms of normal modes of motion. Practical methods of determining natural frequencies and normal modes are discussed, and it is shown that solutions based on finite-difference equations can be obtained with the use either of a digital sequence calculator or an electrical analog. A discussion is given of coupled horizontal bending and torsional modes as well as vertical modes of vibration. It is pointed out that the finite-difference-equation method applied to vertical vibration of a vessel of merchant type has given results in good agreement with experimental values up to the sixth vertical mode. (Author)

UCRL-10788
Lawrence Radiation Lab., Univ. of California, Berkeley.
IMPACT OF DISLOCATION THEORY ON ENGINEERING
John E. Dorn. May 63, 49p
Contract W7405-eng-48
OTS $4.60

DESCRIPTORS: *Metallurgy, *Crystal structure

SCTM-55-63(46)
Sandia Corp., Albuquerque, N. Mex.
AN AUTOMATIC AUXILIARY FUSE CIRCUIT
R. R. Petrini. Mar 63, 15p
Contract AT(29-1)789
OTS $1.60

SC-4760(RR)
Sandia Corp., Albuquerque, N. Mex.
CRATERS FROM REPEATED DIRECT HITS AT THE SAME AIMING POINT
L. J. Vortman, Jan 63, 8p
Contract AT(29-1)789
OTS $1.10

DESCRIPTORS: *Explosion effects, *Cratering,

TID-18774
Sandia Lab., Albuquerque, N. Mex.
A DUST-LADEN AIR FLOW TUBE
John R. Banister. [May 63] 25p
Contract AT(29-1)789
SCDC-3244
OTS $2.60

TID-19025
Sandia Corp., Albuquerque, N. Mex.
FAILURE FROM A MATERIALS POINT OF VIEW
C. F. Bild. 10 Jun 63, 13p
Contract AT(29-1)789
SCDC-3266
OTS $1.60

SC-4421A(RR)
Sandia Corp., Albuquerque, N. Mex.
A METHOD OF MEASURING (1) THE PARAMETERS OF IMPACT BETWEEN TWO PLANE SURFACES AND (2) THE PROPERTIES OF THE PLANE SHOCK WAVES PRODUCED. Instrumentation research.
Don Lundergan. Rev. Apr 63, 48p
Contract AT(29-1)789
OTS $4.60

TID-18816
Sandia Corp., Livermore, Calif.
THE CONVERSION OF ELECTROMAGNETIC ENERGY INTO SHOCK PULSES
T. F. Meagher. May 63, 25p
Contract AT(29-1)789
SCDC-2046
OTS $2.60

DESCRIPTORS: *Impact shock, *Electromagnetic waves.

Chemical Engineering

TID-18624
General Mills, Inc., St. Paul, Minn.
STUDY OF A LARGE-VOLUME IMPACTOR FOR HIGH-ALTITUDE AEROSOL COLLECTION
A. R. McFarland and H. W. Zeller. 1 Apr 63, 100p
Contract AT(11-1)401
Rept. no. 2391
OTS $8.60

DESCRIPTORS: *Aerosols, *Sampling,

HW-73404
Hanford Atomic Products Operation, Richland, Wash.
PARTICLE DEPOSITION IN A ONE-HALF INCH CONDUIT
V. F. FitzPatrick, S. M. Nielson, and L. C. Schwendiman. 8 Jun 62, 16p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: *Particles, *Zinc, *Sulfides, *Pipes.

LADC-5792
Los Alamos Scientific Lab., N. Mex.
PROBLEMS IN THE OPERATION OF LARGE CRYOGENIC SYSTEMS
F. Edeskuty, D. Liebenberg, and J. Novak, [1963], 28p
Contract W7405-eng-36
OTS $2.60

DESCRIPTORS: *Cryogenics, *Hydrogen.

TID-19015
Massachusetts Inst. of Tech., Cambridge.
RADIOISOTOPES FOR COARSE ORE CONCENTRATION. Final rept. for 15 Jan 62
A. M. Gaudin and Harald Ramdohr. 31 Jan 62, 47p
Contract AT(30-1)2329
OTS $4.60

DESCRIPTORS: *Copper, *Minerals,

ORNL-TM-609
Oak Ridge National Lab., Tenn.
PRODUCTION OF FERTILIZER IN A MULTIPURPOSE ATOMIC POWER REACTOR COMPLEX FOR DISTILLATION OF SEA WATER: A SURVEY
R. E. Blanco. 3 Jul 63, 37p
Contract W7405-eng-26
OTS $3.60

DESCRIPTORS: *Power reactors, *Sea water, *Fertilizers.

TID-18981
Oklahoma Univ. Research Inst., Norman.
STUDY OF SEQUESTRATION OF METAL IONS IN BRINE USING RADIOISOTOPES
Robert N. Thompson and George W. Reid. 1 Aug 61, 23p
Contract AT(40-1)2698
OKLA-2698-1
OTS $2.60

DESCRIPTORS: *Tracer studies, *Petroleum, *Recovery, *Acetic acids, *Sodium, *Salts.

IDO-14621
Phillips Petroleum Co., Idaho Falls.
CHEMICAL PROCESSING TECHNOLOGY. Quarterly progress rept., Apr-Jun 63.
J. R. Bower, ed. 15 Jan 64, 42p
Contract AT(10-1)205
OTS $1.00

SL-1998
Sargent and Lundy, Engineers, Chicago, Ill.
SALINE WATER CONVERSION POWER REACTOR PLANTS 11 Jan 63, 201p
Contract W7405-eng-26
OTS $14.00

DESCRIPTORS: *Sea water, Distillation, Power reactors, Heavy water reactors,

Electrical and Electronic Engineering

AD-420 963
Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
EVALUATION OF FLAT ELECTRIC CABLE FOR INTERCONNECTING SYSTEM COMPONENTS. Final rept.
P. Ardizzi. 16 Sep 63, 34p
NADC-EL-6335
OTS $1.00

DESCRIPTORS: *Electric cables, Coaxial cables, Aircraft, Feasibility studies, Electrical properties, Effectiveness, Data.

An evaluation was made of commercially available flat cable assemblies and NAVAIRDEVCEN fabricated recti-cable harnesses to determine their suitability for use in place of conventional cables and wire bundles. Ribbon cable can be used for cable harnesses, with a resulting savings in weight and space requirements. Recti-cable needs further development before it can be considered for aircraft use. (Author)

AD-420 967
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF ELECTROLUMINESCENT VIDEO DISPLAYS. Master's thesis
Carlton John Peterson. Aug 63, 90p
GE/EE/63-22
OTS $2.25

DESCRIPTORS: *Electroluminescence, *Television receivers, *Viewing screens, Display systems, Semiconductor devices, Ferroelectric materials, Circuits, Design, Operation, Feasibility studies.

The design and fabrication of electroluminescent (EL) video displays requires a consideration of such topics as; the phenomena of electroluminescence, the operation of coincident-scan EL panels, the dynamic intensity requirements of video displays, the continuous control of EL displays, the threshold and storage characteristics of EL control mechanisms, the characteristics of ferroelectric (FE) materials, the operation of FE transchargers, the operation of coincident transcharger arrays, and the design of solid state EL-FE transcharger video displays. The experimental and theoretical analysis of these topics is used as a basis for determining the characteristics and feasibility of EL solid state television receivers. (Author)

AD-419 140 repriced
Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF CAPILLARY EMITTER THERMIONIC CONVERTERS. Final rept., 15 May 61-15 Aug 63, on Static Energy Conversion
D. L. Dresser, J. D. Dunlop, H. Huber, R. LeBihan, and V. L. Hill. Sep 63, 190p
Contract AF33(616)8299
Rept. no. EDR-3532; ASD-TDR-63-865; N64-13766
OTS $3.00

DESCRIPTORS: *Thermionic emission, *Thermionic converters, *Capillaries, Ionic current, Energy conversion, Ion sources, Electrons, Cesium, Vapors.

A random current theoretical model is formulated to describe the emission of ions and electrons from a capillary thermionic emitter. Extensive experimental results from monocapillary and multicapillary devices are shown to be in good agreement with the theory. Practical power densities of 5 to 15 watts/square cm were obtained between 1900 and 2100 degrees K. A modified capillary emitter in which no cesium flow is required was also investigated and found to agree with the random current model. Ion current measurements, high frequency oscillations, and spectroscopic data are used to interpret the operating conditions of the capillary emitter. Technology developments are reported on the subjects of emitter fabrication and chemical vapor deposition. (Author)

PB-165 134
Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
ANALYSIS AND DESIGN OF TUNNEL DIODE DIPOLE ANTENNAFIERS. Rept. on Research on Techniques for Integration of Active Elements Into Antennas with Antenna Structure
Kyohei Fujimoto. 15 May 63, 106p
Contracts AF33(657)10386 and BPSN3-6399-62780-1
Rept. no. 1566-1; N63-18641
OTS $9.10

DESCRIPTORS: *Dipole antennas, *Antenna components, *Amplifiers, *Tunnel diodes, Analysis, Design, Electrical impedance, Signals, Noise.

A study of dipoles loaded with tunnel diodes is presented. The tunnel diode appears to be the simplest element that can be used for the antennafier (combined antenna and amplifier). The analysis and discussion of the loaded-dipole antenna covers the fundamental problems of the antennafier and may lead to the development of further advanced and more complicated antennafiers such as Yagis, supergain arrays, etc., which will contribute to significant improvements in receiver performance. Four types of loaded-dipole antennas, which are variations of the double-H antenna depending on the place of loading, are discussed with regard to the input impedance, gain, and noise performance, and some experimental results are shown. Measurements show that the theoretical analysis is essentially in agreement with the experimental results.

PB-165 110
[Army] Frankford Arsenal, Philadelphia, Pa.
DEVELOPMENT OF TEMPERATURE AND TIME PARAMETERS IN DIP SOLDERING OF PRINTED CIRCUITS
Robert P. Hogan. 15 Jan 60, 22p
Test rept. T60-12-1; AD-232 624
OTS $2.60

DESCRIPTORS: *Printed circuits, Temperature, *Soldering, Time.

The optimum soldering temperature and time for effective dip soldering of copper clad (XXXP) printed circuit boards is 500°F for 5 to 10 seconds. There are no deleterious effects upon resistors and capacitors when dip soldering at temperatures ranging from 450°F to 638°F for time durations of from 1 to 10 seconds. A dip soldering temperature of 550°F at 10 seconds, 600°F at 10 seconds, and 638°F at 5 and 10 seconds can cause blistering and burning to a copper clad (XXXP) printed circuit board. (Author)

NAA-SR-MEMO-8145
Atomics International, Canoga Park, Calif.
REPORT OF THE QUALIFICATION TESTING OF SNAP 10A FIXED RESISTORS
J. S. Holtwick, III. 23 Jan 63, 31p
Contract AT(11-1)GEN-8
OTS $3.60

AD-418 730
Johns Hopkins Univ., Baltimore, Md.
A SIMPLE HOT-WIRE ANEMOMETER
Leslie S. G. Kovasznay, Leslie T. Miller, and B. R. Vasudeva. Jul 63, 34p
Contract Nonr-3623(00)
Proj. Squid Technical rept. JHU-22-P
OTS $3.60

DESCRIPTORS: *Anemometers, Transistors, *Transistor amplifiers, Electric bridges, Current amplifiers, Air, Velocity, Temperature sensitive elements, Equations, Partial differential equations, Noise (Radio)

Due to the low impedance potentialities of transistor circuits, a very rugged and simple hot-wire anemometer was developed using the constant temperature principle. The wire is placed in a resistance bridge and bridge balance is maintained by closing the feedback loop by a d. c. amplifier. The appropriate nonlinear circuit to invert "King's law" consists of two squaring circuits and an adjustable bias. This device is called a "linearizer" and converts the output of the hot-wire anemometer circuit into a voltage proportional to velocity. A large number of these amplifier and linearizer units have been built and are sucessfully used in multichannel hot-wire measurements. (Author)

AD-422 854
Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC GENERATOR. Final rept., 1 Oct 62-30 Sep 63, on High Temperature Thermoelectric Research
C. M. Henderson, R. G. Ault, E. R. Beaver, H. B. Jankowsky, and R. J. Janowiecki. Oct 63, 156p
Contract AF33(657)7387
ASD-TDR-62-896, Part II; N64-12224
OTS $3.00

DESCRIPTORS: *Thermoelectricity, *Generators, Materials, *Thermionic emission, Energy conversion, Electric power production, High temperature research, Vacuum apparatus, Additives, Coatings.

Tests were performed on high temperature p- and n-type thermoelectric materials to determine their resistance to damage from sublimation (to 1200°C and to 10^{-6} mm Hg) and thermal shock (to 200°C/minute). Segmented p- and n-type thermoelements, capable of operating between 1200°C and 500°C in a vacuum, were produced and evaluated for use in an advanced model generator. On the basis of the evaluations made on the segmented thermoelements, a nominal 50-watt advanced experimental model generator was designed, fabricated, and preliminarily tested. This generator weighed 3.88 lb and produced 49.88 watts when operated at a hot junction temperature of 1215°C and cold junction temperature of 570°C in a vacuum of 10^{-6} mm Hg. This performance equaled 12.8 watts/lb (excluding heat source). The segmented high temperature p- and n-type thermoelements and highly emissive radiator coating were largely responsible for the improved watts/lb performance attained. (Author) (See also AD-294 624)

ORNL-TM-606
Oak Ridge National Lab., Tenn.
ANALYTICAL DETAILS CONCERNING "MACHINE TIME" IN TIME-AMPLITUDE CONVERSION
W. F. Mruk. 20 Jun 63, 11p
Contract W7405-eng-26
OTS $1.60

DESCRIPTORS: *Pulse analyzers, *Photomultipliers.

PB-165 126
Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH ON A 500 WATT SOLAR REGENERATIVE H_2-O_2 FUEL CELL POWER SUPPLY SYSTEM.
Semiannual rept. no. 1, 15 Oct-31 Dec 59
John M. Lee. [1960] 56p
Contract DA36-039-sc-85259
Rept. no. PWA-1782; ARPA Order no. 80-59; AD-234 095
OTS $5.60

DESCRIPTORS: *Power supplies, Fuel cells, Design, Hydrogen, Oxygen, Gas generating systems, Gases, Liquids, Separation, *Electrolytic cells, Control systems, Electrolysis, Solar energy.

It is the purpose of this contract to conduct research investigations leading to the development of a regenerative 500 watt hydrogen-oxygen fuel cell system. A complete solar power system for use in orbiting space vehicles is comprised of two major components; a solar-to-electrical energy converter and an energy storage system. It is the energy storage system, consisting of a fuel cell, electrolysis cell and associated control and storage components on which research and development is being conducted under this contract. Initial emphasis has been given the electrolysis-gas separation system; the one about which least is known. Simple electrolysis and gas separation units have been run for preliminary data and more sophisticated units are being set up to obtain accurate data. (Author)

SC-4794(RR)
Sandia Corp., Albuquerque, N. Mex.
PREPARATION OF RESISTORS USING A LOW-TEMPERATURE-COEFFICIENT-OF-RESISTANCE ELECTROLYTE
R. D. Kelly. Jan 64, 148p
Contract AT(29-1)789
OTS $2.50

PB-165 117
Washington Square Coll., New York Univ., N. Y.
ELECTRETS. Rept. no. 1, 1 Jun-31 Aug 52
J. H. Rohrbaugh. 1 Sep 52, 27p
Contract AF19(604)407
ATI-172 615
OTS $2.60

DESCRIPTORS: *Electrets, Dielectrics, Polarization.

AD-426 956 repriced
Westinghouse Electric Corp., Elkridge, Md.
MICROMINIATURE INTEGRATED CIRCUIT PACKAGE. Final rept., 1 Jul 62-1 Aug 63
E. P. Barbaro. [1963] 57p
Contract DA36-039-sc-90850
OTS $1.50

DESCRIPTORS: *Microminiaturization (Electronics) *Integrated circuits, *Packaged circuits, Ceramic materials, Encapsulation, Environmental tests, Reliability (Electronics), Design, Construction.

Design and fabrication of two metal to glass seal microminiature integrated circuit packages were completed. One which utilized the .310 inch square ceramic base as an integral portion of the package and the other a .225 inch square package per the stated requirements of the contract. The .310 inch square package required more development as leak rates of only $<1 \times 10^{-6}$ cc/sec at one atmosphere were achieved. However, on the contract package lead rates $< 1 \times 10^{-8}$ cc/sec at one atmosphere were attained. This was accomplished through revisions of graphite molds, glass preform designs, kovar oxide layer control and sealing techniques. To prove package feasibility, twenty-four Westinghouse Functional Electronic Blocks were encapsulated in the .225 inch square microminiature planar package. No problems in assembly were encountered. After approval of mechanical samples and packages with integrated circuits, production of the required 10,000 packages commenced. Environmental studies were conducted on this package type confirming reliability of the package structure. Application data was compiled for circuit mounting, wiring, sealing and hermeticity testing of the microminiature circuit package developed for this contract. (Author)

AD-420 964
Westinghouse Electric Corp., Newbury Park, Calif.
ASSEMBLY TECHNIQUES FOR CAMERA TUBES.
Final technical rept.
B. C. Einstein. 15 Oct 63, 52p
Contract AF33(657)8675
RTD-TDR-63-4003
OTS $1.50

DESCRIPTORS: *Manufacturing methods, *Camera tubes, *Image tubes, *Electron tubes, Photosensitivity, *Cathodes (Electron tubes), Diodes (Electron tubes), Photomultipliers, Image intensifiers, Vacuum apparatus, Low-pressure research, Feasibility studies

Work was performed to prove feasibility and develop technologies for "In-Vacuum Processing" of photosensitive imaging tubes. In-Vacuum Processing is a new tube technology whereby a photosensitive tube is activated and assembled in a vacuum system. The task of the work to date has been to establish the conditions under which this goal may be met. Also, mechanical tube assemblies and equipment were developed. It has been shown that operable photodiodes, photomultiplier, image intensifiers, and image orthicons can be assembled by this process. It has also been shown that tubes comparable to similar commercial units may be fabricated in vacuum. One of the main problems, the transfer of photosurfaces in the vacuum chamber, is now better understood; and photocathode transfer without appreciable loss of sensitivity is possible. (Author) (See also AD-297 020)

Mechanical Engineering

AD-426 431
Naval Research Lab., Washington, D. C.
PRACTICAL CONSIDERATIONS IN APPLYING LABORATORY FRACTURE TEST CRITERIA TO THE FRACTURE-SAFE DESIGN OF PRESSURE VESSELS
W. S. Pellini and P. P. Puzak. 5 Nov 63, 34p
NRL rept. 6030; N64-13840
OTS $1.00

DESCRIPTORS: *Pressure vessels, *Fracture (Mechanics), *Steel, Design, Tests.

Trends in pressure vessel applications involving higher pressures, lower service temperatures, thicker walls, new materials, and cyclic loading require the development of new bases in the supporting scientific and technological areas. This report presents a "broad look" analysis of the opportunities to apply new scientific approaches to fracture-safe design in pressure vessels and of the new problems that have arisen in connection with the utilization of higher strength steels. These opportunities follow from the development of the fracture analysis diagram which depicts the relationships of flaw size and stress level for fracture in the transition range of steels which have well-defined transition temperature features. The reference criteria for the use of the fracture analysis diagram is the NDT temperature of the steel, as determined directly by the drop-weight test or indirectly by correlation with the Charpy V test. Potential difficulties in the correlation use of the Charpy V test are deduced to require engineering interpretation of Charpy V test data rather than to involve basic barriers to the use of the test. The rapid extension of pressure vessel fabrication to Q&T steels is expected to provide new problems of fracture-safe design. These derive from the susceptibilities of steels within this family to tear fractures of low energy absorption. This fracture mode does not involve a transition temperature and is therefore relatively independent of temperature. It is emphasized that such susceptibilities are not inherent to the family of Q&T steels of low and intermediate strength levels, but are related to specific metallurgical conditions of the plate and particularly the HAZ (heat-affected-zone) regions of Q&T steel weldments. (Author)

PB-181 602
Pope, Evans and Robbins, New York.
PACKAGE COAL-FIRED BOILERPLANT 60,000 LBS. PER HR. CAPACITY ABOVE GROUND COAL STORAGE VERSION. [1963] 141p
[Contract OCR14-01-0001-242]
Office of Coal Research Specification no. OCR-60A
OTS $7.00

DESCRIPTORS: *Power plants (Establishments), Automatic, *Steam power plants, *Boilers, Design, Specifications, Coal, Storage, *Tanks (Containers), Conveyors,

Specifications are given for a coal-fired boiler plant, of 60,000 lbs./hr. capacity, along with auxiliary equipment and structures. Coal storage is in the form of a combination coal and ash storage silo with a capacity of approximately 250 tons of coal and 20 tons of ash. Coal transfer to the stoker hoppers and ash removal to the silo ash compartment is automatic. The plant is designed to operate mechanically with intermittent attendance by one operator. (See also PB-181 601)

PB-181 601
Pope, Evans and Robbins, New York.
PACKAGE COAL-FIRED BOILERPLANT 60,000 LBS. PER HR. CAPACITY BELOW GROUND COAL STORAGE VERSION. [1963] 141p
[Contract OCR14-01-0001-242]
Office of Coal Research Specification no. OCR-60
OTS $7.00

DESCRIPTORS: *Power plants (Establishments), Automatic, *Steam power plants, Design, Specifications, Coal, Storage, *Tanks (Containers), Underground structures, Conveyors,

Specifications are given for a coal-fired boiler plant, of 60,000 lbs./hr. capacity, along with auxiliary equipment and structures. Coal storage is in the form of a 240 ton coal tank, with a system for automatically transferring coal to the stokers and removing ashes to an ash silo. The plant is designed to operate automatically with intermitten attendance by one operator. (See also PB-181 602)

PB-165 136
Aerojet-General Corp., Sacramento, Calif.
BASIC GRAIN DESIGN AND THE 564 INTERIOR BALLISTICS COMPUTER PROGRAM
A. E. Whetstone, T. R. Threewit, and J. S. Billheimer.
10 Jun 61, 205p
Contract DA04-200-506-ORD-1120
Rept. no. STM-143
OTS $14.00

DESCRIPTORS: *Interior ballistics, Handbooks, Solid rocket propellants, *Rocket propellant grains, Design, Gas flow, Dynamics, *Programming (Computers), Rocket motors.

This manual presents a system of interior ballistics that provides the designer with the most advanced tools of grain design and gas dynamic performance prediction available for solid rocket motors. It is intended to be a helpful handbook as well as an explanation of the methods and results of an organized analysis. The two major sections of this manual are Section II, which contains grain design principles and practices, and Section III, which contains the gas dynamics principles utilized in the computer program. The first section is further subdivided into two parts. The first part is a general discussion and the second part presents the methods of analysis and the application of the analytical results. Section III begins with a general discussion of the computer program followed by a description of the program input data. Appendix A contains the gas dynamics equations and their derivations. It illustrates how gas dynamics parameters are worked into the computer program. Appendix B defines and explains sliver, and Appendix C contains performance curves for the Slot design. The concept for configuration efficiency is derived and explained in Appendix D. (Author)

AD-274 087
Avco-Everett Research Lab., Mass.
A STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME I. Jan 62, 327p
Contract AF33(600)41291
ASD-TR-61-348, Volume I
OTS $19.75

DESCRIPTORS: *Satellite (Artificial), *Drag, *Air brake flaps, *Atmosphere entry, Recovery, Re-entry vehicles, Space capsules, Deceleration, *Aerodynamic control surfaces, Design, Airframes, Structures, Materials, Titanium alloys, Nickel alloys.

Research and development on Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, text planning and requirements, peripheral supporting studies and problem areas Significant advances in coated wire mesh skin development and nominal trajectory follower type of control systems are reported. In this 4-volume report, Vol. I contains general introductory material and discusses the Drag Brake System and mission, and structure. (Author)

AD-275 253
Avco-Everett Research Lab., Mass.
STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME II. Jan 62, 405p
Contract AF33(600)41291
ASD-TR-61-348, Volume II
OTS $22.25

DESCRIPTORS: *Satellite (Artificial), *Drag, *Air brake flaps, Recovery, *Atmosphere entry, Re-entry vehicles, Deceleration, *Space capsules, *Aerodynamic control surfaces, Design, Materials, Wire screens, Heat resistant paints, Instrumentation, Telemeter systems.

Research and development on Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, text planning and requirements, peripheral supporting studies and problem areas. Significant advances in coated wire mesh skin development and nominal trajectory follower type of control systems are reported. In this 4-volume report, Vol. II covers skin and capsule design, flight control, recovery, telemetry, and instrumentation. (Author) (See also AD-274 087)

AD-274 088
Avco-Everett Research Lab., Mass.
STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME III. Jan 62, 380p
Contract AF33(600)41291
ASD-TR-61-348, Volume III
OTS $21.00

DESCRIPTORS: *Satellite (Artificial), *Drag, *Air brake flaps, *Atmosphere entry, Recovery, Re-entry vehicles, Space capsules, Deceleration, *Aerodynamic control surfaces, Design, Aerodynamics, Thermodynamics, Aerodynamic heating, Ground support equipment, Test methods, Tests.

Research and development on Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, Text planning and requirements, peripheral supporting studies and problem areas. Significant advances in coated wire mesh skin development and nominal trajectory follower type of control systems are reported. In this 4-volume report, Vol. III discusses aerospace dynamics, ground support, and system tests. (Author)
(See also AD-275 253)

AD-274 089
Avco-Everett Research Lab., Mass.
STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME IV. Jan 62, 542p
Contract AF33(600)41291
ASD-TR-61-348, Volume IV
OTS $26.00

DESCRIPTORS: *Satellite (Artificial), *Drag, *Air brake flaps, *Atmosphere entry, Recovery, Re-entry vehicles, Space capsules, Deceleration, *Aerodynamic control surfaces, Design, Specifications, Engineering, Data.

Research and development on Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, test planning and requirements, peripheral supporting studies and problem areas. Significant advances in coated wire mesh skin development and nominal trajectory follower type of control systems are reported. In this 4-volume report, Vol. IV contains appendixes. (Author) See also AD-274 088)

PB-165 099
Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE EFFECT OF WIND AND ROTATION OF THE EARTH ON UNGUIDED ROCKETS
J. V. Lewis, Mar 49, 21p
Rept. no. 685
OTS $2.60

DESCRIPTORS: *Rockets, *Geophysics, Wind, Earth, Rotation, *Rocket trajectories.

A brief discussion is given of the determination, by weighting factor curves, of first order wind effects. Formulas for the displacement of the point of fall of an unguided rocket are given which require only the vertical velocity-time function of the rocket. The effect of tilting the launcher is given. The wind and tilt effects may be computed independently provided only that the vertical velocity-time function for the particular tilt is used. An example is given of the calculation of wind effects. A discussion is included of the effects of the rotation of the earth. (Author)

NASA-TN-D-2055
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STUDY OF THE USE OF THERMAL CONTROL TECHNIQUES FOR GUIDANCE DURING DIRECT AND SKIP ENTRIES FOR A CAPSULE-TYPE VEHICLE AT PARABOLIC VELOCITY
John W. Young. Jan 64, 47p
N64-14393
OTS $1.25

UCRL-7360-T
Lawrence Radiation Lab., Univ. of California, Livermore.
IGNITION OF EXPLOSIVES BY LOW VELOCITY IMPACT
G. D. Dorough, L. G. Green, E. James, Jr., and D. T. Gray. 10 May 63, 22p Prepared in cooperation with Naval Weapons Lab.
Contract W7405-eng-48
OTS $2.60

NASA-TN-D-1996
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ESTIMATION OF TOLERANCE LIMITS FOR METEOROID HAZARD TO SPACE VEHICLES 100-500 KILOMETERS ABOVE THE SURFACE OF THE EARTH
Charles C. Dalton. Feb 64, 58p
N64-14391
OTS $1.50

PB-165 128
Naval Ordnance Lab., White Oak, Md.
THE BEHAVIOR OF EXPLOSIVES AT VERY HIGH TEMPERATURES
Joseph Wenograd. 14 Oct 60, 31p
NAVWEPS rept. 7328; AD-251 121
OTS $3.60

DESCRIPTORS: *Explosive materials, High temperature research, Sensitivity, Pyrolysis, Reaction kinetics.

The impact sensitivities of organic high explosives are related in a simple manner to the velocities of their thermal decomposition reactions at very high temperatures, 300°-1000°C. It has been possible, by means of a new experimental technique, to measure the time delay to explosion for a series of explosives in this hitherto unexplored range of temperature and reaction rate. This has been accomplished by loading the explosive into fine hypodermic needle tubing which can then be heated, essentially instantaneously, by a capacitor discharge. The temperature and explosive event are recorded by monitoring the resistance of the tube. The measured delay times are related to the impact sensitivities of high explosives as sensitive materials are found to explode more rapidly at a given high temperature than less sensitive ones. (Author)

PB-165 108
Naval Ordnance Lab., White Oak, Md.
A DIFFERENTIAL RESISTANCE METHOD FOR MEASURING IGNITION TIMES AND THRESHOLD FIRING ENERGIES OF ELECTRIC PRIMERS
V. M. Korty. 23 Jul 46, rev. 4 Nov 47, declassified 28 May 56, 15p
NOLM 8636
Available on loan from OTS

DESCRIPTORS: *Primers, *Electric igniters, *Rocket igniters, *Ignition, Resistance (Electrical), Measurement, Electric bridges, Oscillographs.

An effort was made to develop a new method for measuring ignition times, threshold firing energies, and bridge wire breaking times. Investigation was made of the usefulness of oscillograms of resistance-time curves of electric squibs activated by constant current. A rough theory was worked out and data were obtained from twenty-three runs on the D-55 electric squib that is used in rocket igniters. (Author)

PB-165 106
Naval Ordnance Lab., White Oak, Md.
EFFECTS OF THE EXPLOSION OF 45 TONS OF TNT UNDER WATER AT A DEPTH SCALED TO TEST BAKER. Interim rept. 10
G. A. Young. 1 Dec 54, declassified 15 Jan 58. 169p
NAVORD rept. 3624; AFSWP 485; AD-58 816
OTS $12.00

DESCRIPTORS: Explosive materials, *TNT, *Underwater explosions, *Explosion effects.

A 45-ton charge of TNT was fired at half-depth in 24.0 feet of water, geometrically scaling Bikini Baker. Measurements were made of air and underwater shock pressures, water waves, cratering, dome formation, plume and base surge behavior and the dispersion of tracer

material by the fallout and surge. The primary air and underwater shock waves scaled the Baker shock waves fairly well, but the plume and base surge phenomena were fundamentally different from the Baker results. Water wave and cratering data indicate that the same scaling laws do not apply over the small charge and nuclear ranges. (Author)

PB-165 109
Naval Ordnance Lab., White Oak, Md.
A HOT WIRE IGNITION APPARATUS
G. B. Butters and J. N. Ayres. 15 Apr 49, declassified, 4p
NOLM 9991
OTS $1.10

DESCRIPTORS: *Propellants, Ammunition propellants, Ignition, *Igniters, Design, Thyratrons.

A hot wire ignition apparatus, utilizing a thyratron controlled condenser bank, was developed to study ignition characteristics of gun propellants. The apparatus attempts to control temperature, contact area and contact pressure. A description and discussion of the apparatus is presented. (Author)

SCTM-144-60(51)
Sandia Corp., Albuquerque, N. Mex.
EXPLOSIVE PERFORMANCE OF SEVERAL SMALL SPHERICAL EXPLOSIVE CHARGES
R. P. Reed and W. E. Taylor. 30 Jun 60, 16p
Contract AT(29-1)789
OTS $1.60

AD-424 419
TAPCO, Div. of Thompson Ramo Woolridge, Inc., Cleveland, Ohio
SPACE RADIATOR STUDY. Final rept.
R. J. Denington, A. Koestel, A. V. Saule, R. I. Shure, and G. T. Stevens. Oct 63, 276p
Contract AF33(616)7368
ASD-TR-61-697
OTS $4.00

DESCRIPTORS: *Radiators, *Condensers (Liquefiers), Auxiliary power plants, Spacecraft, *Heat transfer, Fluid mechanics, Sodium, Rubidium, Potassium, Mercury, Space environmental conditions, Thermodynamics.

Design techniques are presented for condenser-radiators for condensing mercury, sodium, potassium, and rubidium vapors for Rankine cycle space power plants. Included in the design techniques are radiation heat transfer, fluid mechanics, meteoroid protection and materials considerations, with the fluid mechanics stability aspects emphasized. Parametric data for large alkali metal condenser radiators relating geometry to weight and area are presented. Test were conducted with water, sodium, potassium, and rubidium to investigate flow regime and stability in vertical up flow condensing. A correlation is presented for predicting the transition from a stable annular film flow to a slugging regime. Techniques for estimating pressure drop and inventory are provided. Condensing heat transfer coefficients for potassium and rubidium are measured and found to vary from 200 to 4000 Btu/hr ft ^{2} ^{o}F at relatively low velocities and pressures. Similar results are presented for sodium from the literature. This report summarizes the recommended design procedures, parametric data and the experimental details. (Author)

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

TID-19861
Massachusetts Inst. of Tech., Cambridge.
A STUDY OF THE EFFECTS OF SUB-STERILIZATION DOSES OF RADIATION ON THE STORAGE LIFE EXTENSION OF SOFT-SHELLED CLAMS AND HADDOCK FILLETS. Annual rept. for 1 May 62-30 Apr 63.
John T. R. Nickerson and Samuel A. Goldblith.
31 Jan 64, 45p
Contract AT(30-1)3006
OTS $1.25

SAN-1021
National Canners Association, Berkeley, Calif.
APPLICATION OF RADIOCHEMISTRY TECHNIQUES IN FOOD PROCESSING RESEARCH. PART II. RADIOISOTOPIC TRACER TECHNIQUES IN EVALUATION AND IMPROVEMENT OF INDUSTRY PRACTICE FOR REMOVAL OF PESTICIDE RESIDUES FROM FOODS. Progress rept.
Walter A. Mercer. May 62, 61p
Contract AT(04-3)296
OTS $6.60

DESCRIPTORS: *Food, *Pesticides,

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

NAA-SR-Memo-8074
Atomics International, Canoga Park, Calif.
VIBRATION AND SHOCK, HIGHWAY TRANSPORT BETWEEN SANTA SUSANA MOUNTAINS AND EDWARDS AIR FORCE BASE
E. L. Gardner. 25 Jan 63, 23p.
Contract AT(11-1)GEN-8
OTS $2.60

DESCRIPTORS: *Impact shock, *Transportation and vibration.

TID-18956
Knolls Atomic Power Lab., Schenectady, N. Y.
WELDING THIN WALLED TITANIUM PRESSURE VESSELS
G. Pagnotta and G. Hume. [1962] 7p
Contract W-31-109-eng-52
OTS $1.10

DESCRIPTORS: *Pressure vessels, *Titanium, *Welding.

TID-18924
Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE APPLICATION OF GAS-LUBRICATED BEARINGS TO HIGH-SPEED, TURBO-MACHINERY. Quarterly technical rept. for 1 Dec 62-28 Feb 63.
J. G. Hinkle, E. J. Gunter, and D. D. Fuller. [1963] 70p
Contract AT(30-1)2512
Q-A2392-3-8
OTS $6.60

DESCRIPTORS: *Bearings, *Turbines

Engines and Propulsion Systems

ACNP-6125(suppl. 1)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
NUCLEAR SUPERHEAT PROPULSION SYSTEM FOR A PASSENGER LINER. 22 Nov 61, 11p
Contract AT(30-1)2650
NYO-9703-07
OTS $1.60

DESCRIPTORS: *Boiling water reactors,

BMI-1209
Battelle Memorial Inst., Columbus, Ohio.
CRITICAL-ASSEMBLY STUDIES ON AN INTERMEDIATE REACTOR FOR AIRCRAFT PROPULSION
Lawrence F. Marinaccio, Richard G. Jung, Francis J. Jankowski, David A. Dingee, and Joel W. Chastain.
15 Jul 57, declassified 3 Jun 63, 87p
Contract W7405-eng-92
OTS $8.10

DESCRIPTORS: *Critical assemblies, *Liquid metal cooled reactors.

PB-165 115
Office of Scientific Research and Development. Div. 3
TEMPERATURE TRANSIENTS IN WALLS OF ROCKET CHAMBERS.
Final rept.
E. A. Cook and E. H. de Butts. Jun 46, declassified 15 Jan 62, 86p
OSRD no. 5887; ATI-34 662
OTS $8.10

DESCRIPTORS: Rocket motors, *Combustion chambers, Temperature, *Heat transfer coefficients.

The problem of determining temperature transients in rocket walls involved the study of effective heat transfer coefficients in a range of conditions intermediate between those of ordinary heating phenomena and those existing in guns. The technical background establishing the need for information on the temperature fluctuations in various rocket weapons, and a summary of the basic theory which guided the experimental work is covered. The major portion of this study involved the design and fabrication of thermoelectric junction installations adequate to the measurement problem in terms of power, useful life and heat flow perturbation; the actual procedure of firing the rounds and the reduction of data; and interpretations of the differences of effective heat transfer coefficient at different parts of the chamber; and the choice and development of electronic equipment and interconnection systems. Tables, graphs, and photographs pertaining to this investigation are appended.

MATERIALS

AD-284 943
Aeronutronic [Newport Beach, Calif.].
BEHAVIOR OF ROCKET NOZZLE MATERIALS AT HIGH TEMPERATURES AND PRESSURES OF COMBUSTION PRODUCT GAS MIXTURES. Quarterly technical rept. no. 1
W. M. Fassell, Jr., J. N. Ong, Jr., R. W. Bartlett, A. M. Saul, and J. T. Hall. 15 Sep 62, 23p
Contract NOw 61-0905-c
Publication no. U-1829; ARPA Order no. 22-62
OTS $2.60

DESCRIPTORS: *Rocket motor nozzles, *Combustion chamber gases, *Refractory materials, *High temperature research, High pressure research, Materials, Chemical reactions, Combustion products.

This study is designed to (1) determine regression rates for various nozzle throat refractory materials in gaseous combustion products at temperatures to 6800 and at pressures to 600 psia, (2) investigate reactions between liquid reaction products and various refractory nozzle materials, and (3) investigate the behavior of these nozzle materials under dynamic conditions to Mach 3 velocities, using simulated gaseous combustion products in the arc plasma facility. Secondary injection and mixing will be used to incorporate other species into the arc jet stream. The experimental equipment to determine regression rates and to investigate liquid-refractory solid reactions was constructed, tested, calibrated and placed into operation, and the arc plasma facility was designed. (Author)

PB-165 116
Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio.
THE APPLICATION OF STATIFLUX FOR NON-DESTRUCTIVE INSPECTION OF NON-CONDUCTING AIRCRAFT MATERIALS
Edward Dugger. Jul 49, 23p
AFTR-5898; ATI-64 541
OTS $2.60

DESCRIPTORS: *Aircraft equipment, *Dielectrics, *Glass, *Plastics, *Ceramic materials, Non-destructive testing, Electrostatics, Particles.

The use of the Statiflux, an electrostatic particle inspection apparatus, for the non-destructive inspection of non-conducting materials is discussed. There are several test procedures which may be used to obtain the best results. The use of the penetrant is necessary for materials which have no metal backing. For metal-backed materials, the penetrant may or may not be required. A colored powder is blown from the spray gun, each powder particle becoming electrostatically charged as it passes through the composition tube and nozzle at high velocity. The charged particles are attracted to any surface cracks, causing a buildup of particles. The equipment and process are satisfactory

for use in the detection of discontinuities in most nonconducting materials such as glass, plastics, and ceramics, or components made of these materials. (Author)

OTS SB-409, Suppl. 1
Office of Technical Services, Dept. of Commerce, Washington, D. C.
METAL COATINGS. Nov 63, 44p
OTS Selective Bibliography SB-409, suppl. 1
OTS $0.10

DESCRIPTORS: *Metal coatings, *Electroplating, *Electrodeposition, *Vapor plating, Sprays, *Plastic coatings, *Phosphate coatings, *Plating,

Lists 671 domestic and foreign references on metal coatings added to the OTS collection from 1960 through August 1963. Reports are listed in the following categories: Electroplating and Electrodeposition; Vapor Plating and Vacuum Deposition; Spray Coatings; Plastic Coatings on Metal; Plating; Phosphate Coatings; Anodic Coatings; and Metal Coatings, General. (Author)

SCTM-53-63 (72)
Sandia Corp., Albuquerque, N. Mex.
AN EXPENDABLE SLIT LIGHT SOURCE FOR SHADOWGRAPH WORK
Robert L. Johnson. Mar 63, 16p
Contract AT(29-1)789
OTS $1.60

Ceramics and Refractories

PB-165 105
Atomics International, Canoga Park, Calif.
THERMAL PROPERTIES OF REFRACTORY MATERIALS. Quarterly progress rept. no. 3
R. E. Taylor and M. M. Nakata. May 63, 22p
Contract AF33(657)7136
ARPA Order no. 24-62; N63-17740
OTS $2.60

DESCRIPTORS: *Refractory materials, *Nozzle inserts, *Thermal diffusion, Test equipment, *Photoelectric pyrometers, Design, *Tantalum, *Titanium compounds, Carbides, Nitrides.

The current status of the development of the transient thermal property apparatus is described. The upper temperature limit of the apparatus has been extended several hundred degrees and it appears feasible to obtain accurate data up to at least 2500°C. Progress has also been made in extending the temperature range downward from the 1200°C minimum imposed by the photomultiplier tube detector. The status of thermal property measurements by existing techniques is also included. Additional thermal conductivity data are presented and the inability of contemporary theory to explain heat conduction in the refractory interstitial compounds is proved. (Author) (See also AD-270 841)

AD-423 400
Battelle Memorial Inst., Columbus, Ohio.
REFRACTORY CERAMICS OF INTEREST IN AEROSPACE STRUCTURAL APPLICATIONS. - A MATERIALS SELECTION HANDBOOK.
Rept. for Mar 62-Jul 63, on Materials Application
J. R. Hague, J. F. Lynch, A. Rudnick, F. C. Holden, and W. H. Duckworth. Oct 63, 414p
Contract AF33(657)8326
RTD-TDR-63-4102; N64-12269
OTS $6.00

DESCRIPTORS: *Refractory materials, *Ceramic materials, Borides, Carbides, Nitrides, Oxides, Sulfides, Silicides, Aluminum alloys, Beryllium alloys *Intermetallic compounds, Handbooks, Bibliographies, Aerospace craft, *Aircraft equipment.

This publication contains refractory-ceramic property data of interest to the designer of aerospace devices. The data are intended to be of value primarily in the preliminary selection of materials. The materials covered are nonmetallic inorganic crystalline materials with melting points above 2730 F (1500 C), including intermetallic compounds and excluding glass, carbon, and graphite. The data are from literature published prior to 1962. The data are presented first by property, under the headings density, melting or decomposition temperature, specific heat, thermal conductivity, thermal expansion, elastic modulus, and bend strength. Then, detailed properties of each of nearly 600 materials are presented according to nominal material composition. A bibliography of 560 items is included. (Author)

TID-18861
Illinois Univ., Urbana.
CRYSTALLIZATION OF THE PEROVSKITE LEAD TITANATE FROM GLASSES. Summary rept. no. 3.
C. K. Russell, C. G. Bergeron, and A. L. Friedberg. 31 May 63, 84p
Contract AT(11-1)915
OTS $8.10

PB-165 111
[ITT Research Inst.] Chicago, Ill.
RESEARCH ON APPLICATION OF FUNDAMENTAL CONCEPTS OF BONDING METALS AND CERAMICS. Quarterly progress rept. no. 5, 21 Apr-20 Jul 53
H. N. Barr, H. H. Rice, and J. A. Stavrolakis. [1953] 29p
Contract AF33(616)97
Proj. no. G 015-3; AD-17 501
OTS $2.60

DESCRIPTORS: *Cermets, *Silicon, Silicon compounds, *Manganese compounds, *Boron, Borides, Ceramic materials, Metals, *Bonding, Material forming, Microstructure, Additives, Iron, Nickel, Cobalt

Experiments were conducted in which Si boride-Si bodies were cold pressed at 40,000 psi and the compacts were sintered on alumina at 1400°C in an He atmosphere. The compositions containing up to and including 30% Si in excess of Si boride exhibited little

improvement in oxidation resistance. Various metal additions were made to the Si boride in an attempt to develop a suitable Si boride-base cermet. The Si boride used in these compositions was reduced to -325 mesh, and the cold-pressing and sintering procedure was used in preparing the specimens. Results indicated that additions of Si, Fe, Mn, Ni-Cr, and Ni-Mo to Copper Si boride resulted in sintered specimens with satisfactory hardness, but low density. Bonding was poor and the sintered specimens were either powdery or honeycombed with cracks with the additions of Ni, Co, Zr-Fe, Ti-Ni, Ta-Ni, and W-Co. Preliminary results indicate that a body of 70.6% Si and 29.4% B, hot pressed at 1500°C, has a density of 2.4, a transverse strength of 40,900 psi, and good oxidation resistance. The microstructure of the hot-pressed Si-B bodies is discussed. (DDC Abstract)

TID-18683
Michigan Univ., Ann Arbor, School of Public Health.
EVALUATION OF THE RADIATION HAZARD FROM URANIUM GLAZES
Robert C. Magor. 17 May 63, 21p
OTS $2.60

DESCRIPTORS: *Uranium, *Glass, *Radiation hazards, *Ceramic coatings.

TID-18809
North Carolina State Coll., Raleigh.
PHASE RELATIONSHIPS IN THE URANIUM-CARBON-OXYGEN SYSTEM
Robert F. Stoops and John V. Hamme. [1962] 21p
Contract AT(40-1)2663
OTS $2.60

DESCRIPTORS: *Carbon, *Phase studies, *Oxygen, *Uranium.

LRR-41
Smith (A. O.) Corp., Milwaukee, Wis.
EQUILIBRIUM STUDIES OF REFRACTORY METAL OXIDES. Final rept. 15 Jun 61-14 Jun 63.
L. J. Fiegel, G. P. Mohanty, and J. H. Healy [1963] 49p
Contract AT(11-1)1048
OTS $4.60

DESCRIPTORS: *Refractory materials, *Oxides,

Fuels, Lubricants, and Hydraulic Fluids

AD-420 580
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
LUBRICATION REQUIREMENTS FOR SPACE ENVIRONMENTS
J. D. Pinson, and W. F. McRae. Oct 63, 43p
AEDC-TDR-63-154; N63-22954
OTS $1.25

DESCRIPTORS: *Lubrication, *Oils, *Greases, Aerospace craft, Gears, Bearings, *Space environmental conditions.

The paper presents a consice review of present work being undertaken by leading scientists throughout the country in development of space lubrication. It presents a detailed description of research undertaken by the Arnold Engineering Development Center in this area with special emphasis on results of tests related to operating gears and bearings in a simulated space environment. (Author)

PB-165 102
Bureau of Mines, Bruceton, Pa.
FLAMMABILITY CHARACTERISTICS OF HIGH TEMPERATURE HYDROCARBON FUELS. Rept. for 1 Jul 58-30 Jun 59, on Aviation Fuels
Joseph M. Kuchta, Sotirios Lambiris, Henry E. Perlee, Donald R. Halagan, and Michael G. Zabetakis.
Feb 60, 42p
Contract DO33(616)57-4
WADC Technical rept. 59-663; AD-236 661
OTS $4.60

DESCRIPTORS: *Aviation fuels, Fuels, Hydrocarbons, *Flammability.

Data are presented on the flammability and spontaneous ignition characteristics of various aircraft fuels. Limits of flammability were determined in air at atmospheric pressure and elevated temperatures under essentially static conditions. Spontaneous ignition temperatures and corresponding ignition delay times were determined under static and dynamic flow conditions. In the static tests, an oxidizing atmosphere of air was used at both reduced and elevated pressures. The dynamic tests were conducted at elevated pressures employing various nitrogen-air concentrations. Other physical properties of these fuels are also presented. In addition, data are reported on the spontaneous ignition of fuel vapor air mixtures contained in cylindrical and spherical vessels which were heated either uniformly or nonuniformly. (Author)

AD-425 420
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
ARCTIC FIELD TEST - ALL-WEATHER BRAKE FLUID
Charles B. Jordan. 12 Nov 63, 26p
CCL rept. no. 151
OTS $0.75

DESCRIPTORS: *Hydraulic brakes, Hydraulic fluids, Arctic regions, *Cold weather tests,

New brake cylinders were packaged with the all-weather brake fluid and installed on 1/2 ton, 3/4 ton, 2 1/2 ton and 5 ton facility vehicles; all-weather brake fluid was placed in the brake systems; the vehicles were then placed in normal facility operation during the period of 12 December 1962 to 1 March 1963. Eleven of the 14 vehicles were parked outside during the test period. The all-weather brake fluid performed satisfactorily in all vehicles. (Author)

AD-420 881
Naval Research Lab., Washington, D.C.
EFFECT OF POLAR-NONPOLAR ADDITIVES ON OIL-SPREADING ON SOLIDS, WITH APPLICATIONS TO NONSPREADING OILS
R. L. Cottington, C. M. Murphy, and C. R. Singleterry. 26 Jul 63, 14p
NRL rept. 5957
OTS $0.50

DESCRIPTORS: *Oils, *Lubricant additives, *Surface-active substances, *Silicones, Fluorocarbons, Sulfonates, Amines, Alcohols, Soaps, Thin films.

Nonspreading oils can be prepared from aliphatic and aromatic hydrocarbons and from many synthetic oils by the proper choice of an adsorbable additive, but an additive which makes one oil nonspreading may cause violent spreading of another oil of much higher surface tension. This anomalous spreading is produced by surface tension gradients that result from decreases in the concentration of additive at the oil/air interface as adsorption on the solid proceeds. Oily contamination of a surface may cause spreading of an otherwise nonspreading oil because the contamination raises the critical surface tension of the surface above the surface tension of the oil. Such contamination rarely produces a critical surface tension above 30 dynes/cm. Consequently a practical nonspreading oil should have a surface tension above 32 dynes/cm so that oily contamination of the surface near the oil will not induce spreading. Effective additives for producing nonspreading include the silicones, various fluoroesters, salts of organic amines with organic acids, high molecular weight organic acids, alcohols or amines, and some oil soluble soaps. A predeposited film of a dimethyl or methylphenyl polysiloxane is found to prevent the spreading of diester or hydrocarbon oils on stainless steel surfaces for as long as nine months. Such a treatment provides an alternative approach to the control of spreading. (Author)

TID-18970
Oak Ridge Gaseous Diffusion Plant, Tenn.
QUALITY CONTROL OF CIRCULATING OIL SYSTEMS BASED ON INTERFACIAL TENSION AND OXIDATION STABILITY
Frederick William Taylor, Sep 63, 16p
Contract W7405-eng-26
OTS $1.60

DESCRIPTORS: *Quality control, *Lubricants, *Oils, *Lubrication, *Hydraulic fluids.

Plastics

AD-421 808
Atlantic Research Corp., Alexandria, Va.
DEVELOPMENT OF FLEXIBLE POLYMERS AS THERMAL INSULATION IN SOLID-PROPELLANT ROCKET MOTORS. Final summary rept., 24 Jun 60-23 Jun 63
T. R. Walton, N. Vasileff, J. V. Duffy, R. O. Thomas, and E. B. Simmons. Jul 63, 193p
Contract DA36-034-ORD-3325
N64-12359
OTS $3.00

DESCRIPTORS: *Epoxy plastics, *Phenolic plastics, *Amino plastics, *Polyester plastics, *Furan resins, *Isocyanate plastics, Mechanical properties, Deformation, *Rocket components, *Thermal insulation, Rocket motors,

Resin systems selected for study were the epoxies, phenolics, polyurethanes, polyesters, furans and melamines. Flexible polymers of all six systems were prepared generally by using internal type plasticizers or modifiers, and to a much lesser extent, by external plasticizers. The insulation performance of promising filled resins were determined by the oxyacetylene torch and static motor firing tests. Mechanical properties, aging properties, and the effect of various fillers and resin composition on insulation performance were determined for a number of the more promising resins. The best insulation developed in this program on the basis of char rate and density was a modified epoxy resin filled with 40 per cent of long-fiber asbestos. The resin is prepared from Epon 828, tetrahydrophthalic anhydride, castor oil (1:00: 1.07:1.49). Its density is approximately 1.47 and its average char rate in low velocity motors using an aluminized propellant with a flame temperature of 5600°F was 1.9 mil/sec; the average char rate for three of the better performing commercial insulations tested in the same motors was 2.6 mil/sec. The second best material developed in this program was a polyurethane resin containing toluene diisocyanate, hexamethylene diisocyanate, castor oil, and polypropylene glycol 150 (10:10:18:14) and filled with 40 percent of asbestos fiber. (Author) (See also AD-282 730)

PB-165 107
Atlantic Research Corp., Alexandria, Va.
FLEXIBLE POLYMER DEVELOPMENT. Monthly progress rept. no. 5, 1 Nov-1 Dec 60 [1960] 10p
Contract DA36-034-ORD-3325-RD
AD-248 325
OTS $1.10

DESCRIPTORS: *Epoxy resins, Mechanical properties, Deformation, Plasticizers, Vegetable oils, Fillers, Asbestos, *Rocket components, *Thermal insulation.

Studies were concerned with (1) the internal flexibilization of epoxy resins, (2) the determination of physical properties of some filled and unfilled resins, and (3) char determination tests on several resin modifications. The structure and physical properties of the following epoxies are tabulated: Epon 815 and 828, Gem Epoxy, Oxiron 2001 and 2002, and AG-13-E. For a given ratio of epoxy to modifier, Epon 815 resins and Gem Epoxy M180 resins have a higher degree of flexibility than Epon 828 resins. Oxiron 2002 modifications have poor tensile strengths. Diepoxide AG-13-E and Oxiron 2001 yield only viscous liquids or incomplete cures with the modifiers and catalysts employed. Tests were conducted to determine the effect of external and internal plasticizers on the char-forming capabilities of the resins. The tests were performed in a combustion furnace with a nitrogen atmosphere at 950 degrees C for 30 min. Results showed that (1) Versamid-modified Epon 828 gave no char, (2) an increase in the amount of LP33 in Epon 828 resulted in a slight increase in char, and (3) the highest yield of char (7 to 8%) was obtained for Epon 828-methyl nadic anhydride-benzyl dimethylamine formulation 10:9:2.5%. Castor oil-modified asbestos-filled resins showed

very good promise for use in rocket motor insulation. As the castor oil is increased, flexibility increases, insulating ability increases, and the char rate decreases. (DDC abstract)

AD-420 880
Naval Research Lab., Washington, D. C.
SURFACE ACTIVITY OF FLUORINATED ORGANIC COMPOUNDS AT ORGANIC-LIQUID/AIR INTERFACES PART V. THE EFFECT OF PARTIALLY FLUORINATED ADDITIVES ON THE WETTABILITY OF SOLID POLYMERS
N. L. Jarvis, W. A. Zisman, R. B. Fox, and L. G. Isaacs. 9 Aug 63, 14p
NRL rept. 5952
OTS $0.50

DESCRIPTORS: *Halocarbon plastics, *Fluorocarbons, *Styrene plastics, *Acrylic resins, *Polyvinyl chloride, *Polyamide plastics, Fluorination, *Surface-active substances, Polymers, Surface properties.

The surface properties of polymeric solids have been successfully modified by the adsorption of appropriate fluorinated compounds at polymer/air interfaces during the formation of the polymer surfaces. It was found that certain fluorocarbon derivatives would adsorb at polymer polymer/air interfaces when added directly to the monomer before polymerization or when placed in a solution of the polymer, in which case the polymer surface was formed by the slow evaporation of the solvent. As expected, the amount of adsorption in either case was found to be dependent upon the organophilic/organophobic balance in the solute, which depends upon its fluorine content, molecular structure, and solubility in the bulk polymer phase. The surface activity of the fluorinated compounds at each polymer/air interface was determined from the changes in wettability of the smooth, solid polymer surfaces brought about by their adsorption. It was demonstrated that additives developed previously to be surface active in organic liquids markedly decreased the critical surface tension of wetting (γc) of polymer surfaces. Values of γc of poly(methyl methacrylate) and a polyvinylidene chloride copolymer (containing 20 percent polyacrylonitrile) were reduced from approximately 39 dynes/cm to between 19 and 21 dynes/cm; when concentrations of about 1 percent by weight of suitable surface-active agents were dissolved in the polymers. (Author)(See also AD-269 273)

ORO-612
West Virginia Univ. Engineering Experiment Station, Morgantown.
PREPARATION OF WOOD-PLASTIC COMBINATIONS USING GAMMA RADIATION TO INDUCE POLYMERIZATION. Interim rept.
James A. Kent, Anthony Winston, and W. R. Boyle. 1 Sep 63, 81p
Contract AT(40-1)2945
OTS $2.00

MATHEMATICS

NYO-10426
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
SOME IMPLICIT FINITE DIFFERENCE SCHEMES FOR HYPERBOLIC SYSTEMS
John Gary. 1 Mar 63, 19p
Contract AT(30-1)1480
OTS $1.60

DESCRIPTORS: *Mathematics

NASA-TN-D-2178
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A STUDY OF FACTORS AFFECTING THE ACCURACY OF POSITION FIX FOR LUNAR TRAJECTORIES
Margery E. Hannah and Alton P. Mayo. Jan 64, 30p
N64-14394
OTS $0.75

NASA-TN-D-2115
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
NUMERICAL SOLUTIONS OF KNUDSEN FLOW ENTERING A CIRCULAR TUBE THROUGH A SMALL AXIAL ORIFICE
Edward A. Richley and Carl D. Bogart. Feb 64, 47p
N64-14520
OTS $1.25

PB-165 118
Notre Dame Univ. [Ind.].
SOME COMBINATORIAL PROBLEMS OF STATISTICAL MECHANICS. Final rept. 20 Jun 55-31 Dec 57
Richard Otter. [1958] 6p
Contract DA11-022-ORD-1856
AROD-1475:-
AD-156 737
OTS $1.10

DESCRIPTORS: *Combinatorial analysis, *Statistical mechanics.

Computing Devices

WAPD-T-1589
Bettis Atomic Power Lab., Pittsburgh, Pa.
DATA FLOW AND STORAGE ALLOCATION FOR THE PDQ-5 PROGRAM ON THE PHILCO-2000
C. J. Pfeifer. Mar 63, 6p
Contract AT(11-1)-GEN-14
OTS $1.10

DESCRIPTORS: *Neutrons, *Diffusion, *Programming (Computers)

WAPD-T-1591
Bettis Atomic Power Lab., Pittsburgh, Pa.
USE OF FORTRAN IN LARGE PROGRAMS
O. J. Marlowe. Mar 63, 6p
Contract AT(11-1)GEN-14
OTS $1.10

DESCRIPTORS: *Programming languages.

UCRL-7196
Lawrence Radiation Lab., Univ. of California, Livermore.
A FORTRAN PROGRAM FOR CALCULATING X-RAY POWDER DIFFRACTION PATTERNS
Deane K. Smith. 8 Apr 63, 74p
Contract W7405-eng-48
OTS $7.60

DESCRIPTORS: *Powders, *X-ray diffraction analysis *Programming (Computers)

LA-2980
Los Alamos Scientific Lab., N. Mex.
HUG. A FORTRAN - FAP CODE FOR COMPUTING NORMAL SHOCK AND DETONATION WAVE PARAMETERS IN GASES
Paul F. Bird, Russell E. Duff, and Garry L. Schott. 11 Sep 63, 69p
Contract W7405-eng-36
OTS $1.75

NYO-2483
Milletron, Inc., Irwin, Pa.
THE PERFORMANCE AND CHARACTERISTICS OF THE MILLETRON TRANSFER FUNCTION COMPUTER
N. B. McLeod and M. A. Schultz. May 63, 40p
Prepared in cooperation with Nuclear Utility Services, Inc., Washington, D. C.
Contract AT(30-1)2898
OTS $3.60

DESCRIPTORS: *Reactors, *Computers, *Power.

AD-290 633
Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
GENERAL SWITCHING THEORY. Final rept. 31 Mar 61-1 Apr 62, on Automatic Computation and Control Techniques
Robert F. McNaughton and T. M. Booth. Oct 62, 84p
Contract AF33(616)7821
Rept. no. MSR 62-16; ASD-TDR-62-599
OTS $8.10

DESCRIPTORS: *Switching circuits, *Sequence switches, *Timing circuits, *Electronic switches, *Electronic relays, Trigger circuits, Theory, Matrix algebra, Mathematical logic, Sequential analysis, Memory devices, Automation.

The objectives of the research on "Automatic Computation and Control Techniques" are to develop a general switching-circuit theory applicable not only to elementary combinatorial circuits but also to the design of complex sequential switching systems involving many variables, multiple inputs and outputs, memory, computation, and control. (Author)

SCTM-22-63(24)
Sandia Corp., Albuquerque, N. Mex.
A CABINET SYSTEM CONCEPT FOR AUTOMATED DATA SYSTEMS
R. A. Richards and R. A. Baker. Jan 63, 13p
Contract AT(29-1)789
OTS $1.60

SCTM-65-63(24)
Sandia Lab., Albuquerque, N. Mex.
A MODULARIZED CABINET SYSTEM FOR AUTOMATED DATA SYSTEMS
N. T. Radman and R. A. Baker. Apr 63, 38p
Contract AT(29-1)789
OTS $3.60

SCTM-89-63(24)
Sandia Lab., Albuquerque, N. Mex.
A MODULARIZED CARD-RACK SYSTEM FOR AUTOMATED DATA SYSTEMS
N. T. Radman. Apr 63, 21p
Contract AT(29-1)789
OTS $2.60

TID-18844
Sandia Corp., Albuquerque, N. Mex.
SHAPE, IBM 1620 FORTRAN LANGUAGE COMPUTER PROGRAM
Jim N. Rogers 24 Jun 63, 34p
Contract AT(29-1)789
SCDC-2047
OTS $3.60

DESCRIPTORS: *Programming (Computers).

SCTM-212-62(24)
Sandia Corp., Albuquerque, N. Mex.
WAVEFORM DIGITIZER
J. A. Abbott, R. W. Seavey, E. J. Bernard, and A. C. Wilken. Nov 62, 55p
Contract AT(29-1)789
OTS $5.60

MECHANICS

AD-421 845
Defense Documentation Center, Alexandria, Va.
SHOCK AND VIBRATION. DATA ANALYSIS AND APPLICATIONS. A report bibliography
Wendell Hercules, comp. Nov 63, 51p
OTS $1.50

DESCRIPTORS: *Environmental tests, Standardization, *Vibration, Statistical analysis, *Bibliographies, Vibration, Impact shock, Data processing systems, Digital computers, Correlation techniques, Harmonic analysis, Symposia.

This bibliography was prepared in response to a request by the Centralizing Activity for Shock, Vibration and Associated Environments in connection with the 33rd Symposium, 3-5 December 1963. References fall within the following broad topic areas: statistical analysis, data analysis equipment, data analysis-computers, data measurement, shock and vibration data, and testing. The bibliography covers the time period 1953 to October 1963 with particular emphasis placed on documents accessioned by DDC since 1958. (DDC abstract)

PB-165 135
Lockheed-California Co., Burbank
INVESTIGATION OF THE REPRESENTATION OF AIRCRAFT SERVICE LOADINGS IN FATIGUE TESTS. Final rept. on Structural Design Criteria
A. J. McCulloch, M. A. Melcon, W. J. Crichlow, H. W. Foster, and R. Rebman. Jan 62, 324p
Contract AF33(616)6575
ASD-TR-61-435
OTS $19.75

DESCRIPTORS: *Loading (Mechanics), *Fatigue (Mechanics), Transport planes, Graphic analysis, Gust loads, *Aircraft,

An investigation was carried out of the effectiveness in fatigue tests of practical representations of aircraft service loadings. The investigation required the development of test apparatus capable of applying typical random loading histories. Using this equipment random gust loadings, military maneuver loadings, ground loadings, and composites of flight and ground loadings were applied. The results obtained were used to evaluate the adequacy of ordered, cyclic loading representations of the random loadings. The evaluations indicate that spectra of cyclic loadings based on simple mean crossing peak counts of service loading records can be directly employed in tests in which the maximum values of applied stress are moderately high. In tests where lower peak stresses are generated, the test lives may provide an unconservative estimate of service life. The results obtained in composite loading tests indicate that the cumulative effect of flight loadings, ground loadings, and ground to air transitions is a nonlinear. However, in one set of tests representing the service conditions in the wing root region of conventional transport aircraft, adequate simulations of the effect of composite random loadings were obtained. (Author)

AD-299 392
Naval Ordnance Test Station, China Lake, Calif.
DYNAMIC PHOTOELASTICITY
Werner, Goldsmith. Nov 62, 120p
NAVWEPS rept. 8037; NOTS TP 3025
OTS $9.60

DESCRIPTORS: *Photoelasticity, Photographic analysis, Stresses, Mathematical analysis.

The presentation is primarily concerned with a critical review of the techniques and results obtained in investigations concerning the propagation of stresses in photoelastic materials. Calibration procedures are examined, and static and dynamic photoelastic properties for the most commonly used birefringent materials are presented. Various methods of photographic recording are reported, including (1) streak photography, (2) high-speed framing cameras operating from continuous or interrupted light sources, (3) the imag-dissector camera, and (4) the use of successive static pictures, suitably displaced in time, for the observation of repeatable events. The advantages and limitations of each method are discussed, and representative fringe patterns obtained from these techniques are displayed for comparison. Quantitative results for a number of investigations are presented and compared with theoretical predictions where possible. Future prospects for dynamic photoelasticity are indicated, with particular reference to the possible applications of birefringent coatings and the use of photoelasticity for problems in three-dimensional wave propagation. A bibliography of 123 items is included. (Author)

SCTM-285-62(71)
Sandia Corp., Albuquerque, N. Mex.
INFLUENCE COEFFICIENTS FOR CIRCULAR PLATES WITH A CONCENTRATED LOAD APPLIED ECCENTRIC TO THE CENTER AND HAVING NO HOLES
R. D. Hoagland, R. O. Letourneau, and R. E. McClellan. Feb 63, 38p
Contract AT(29-1)789
OTS $3.60

SCTM-238-62(71)
Sandia Corp., Albuquerque, N. Mex.
PRESSURE DISTRIBUTION FOR AN ELASTIC CUSHION OF UNIFORM THICKNESS BETWEEN AN AXIALLY LOADED RIGID SPHERE AND A RIGID SPHERICAL SHELL
T. G. Priddy, Nov 62, 10p
Contract AT(29-1)789
OTS $1.10

TID-18926
Sandia Corp., Albuquerque, N. Mex.
TRANSVERSE VIBRATIONS OF TAPERED CANTILEVER BEAMS WITH END LOADS
H. H. Mabie and C. B. Rogers. [Jun 63] 28p
Contract AT(29-1)789
SCDC-3267
OTS $2.60

Aerodynamics and Pneumatics

AD-297 752
Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
THE EFFECT OF CAMBER AND TWIST ON WING PRESSURE DISTRIBUTIONS FOR MACH NUMBERS FROM 2 TO 7.6. PART I: EXPERIMENTAL DATA. Final rept.
Frank H. Durgin and Edward L. Tilton, III. Dec 62, 105p
Contract AF33(616)6475
Rept. no. TR 4; ASD-TDR-62-557, Part I
OTS $9.10

DESCRIPTORS: *Wings, *Delta wings, Pressure, *Airfoils, Supersonic characteristics, Torque, Deformation, Model tests, Wedges, Hypersonic characteristics, Aerodynamic characteristics, Lift, Experimental data, Wind tunnel models, Load distribution, Aerodynamic loading.

Detailed pressure distributions were measured on two series of warped wings. There were four wings in the first series, all having a square semispan planform and the same 4 per cent truncated double wedge thickness distribution. Only the warping was different. One wing was planar, one twisted, one twisted with dihedral, and one cambered. The second series were three 70° delta wings, all 3 per cent thick. One of these was a planar wing, and two were cambered. All the wings in both series, except one of the twisted rectangular wings, were tested at Mach numbers of 2, 3, 4 and 7.6. Data

was always taken at -5, 0, +5 and 10 degrees angle of attack, and in some cases data was also taken at 15° and 20°. The pressure distribution on a flat static pressure plate which extended over the area of both the rectangular and triangular wings was measured at 0° angle of attack at all the Mach numbers. All the data is presented in the tables in this report. (Author)

AD-418 731
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SOME PROPERTIES OF SHOCK RELAXATION IN GAS FLOWS CARRYING SMALL PARTICLES
George Rudinger. Sep 63, 38p
Contract Nonr-3623(00)
Proj. Squid Technical rept. CAL-87-P; N63-22752
OTS $3.60

DESCRIPTORS: *Shock waves, Gas flow, *Particles, Chemical equilibrium, Thermal conductivity, Temperature, Velocity, Pressure, Viscosity, Shock tubes, Drag, Fluid mechanics, Programming (Computer), Fluid dynamic properties.

Shock waves passing through uniform suspensions of droplets or solid particles in a gas upset the velocity and temperature equilibrium between the two phases. As a result, a relaxation zone is created in which equilibrium is gradually re-established. An integration procedure for the calculation of the relaxation zone, suitable for a small digital computer, is described. The effects of varying the shock strength or the properties of the mixture are investigated, and it is noted that some flow variables do not always change monotonically throughout the relaxation zone but may go through a maximum or minimum. The behavior of individual variables is discussed in some detail.

PB 165 075
Grunman Aircraft Engineering Corp., Bethpage, N. Y.
THEORETICAL PREDICTION OF PRESSURES IN HYPERSONIC FLOW WITH SPECIAL REFERENCE TO CONFIGURATIONS HAVING ATTACHED LEADING-EDGE SHOCK. PART I. THEORETICAL INVESTIGATION
Richard A. Scheuing, John W. Brook, Harold R. Mead, Robert E. Melnik, and Wallace D. Hayes (Aeronautical Research Associates of Princeton).
May 62, 192p
Contract AF33(616)6400
ASD-TR-61-60, Part I: N62-14726
OTS $13.50

DESCRIPTORS: *Hypersonic flow, Pressure, Theory, *Wing-body configurations, *Delta wings, Flat plate models, Conical bodies, Airfoils, Fluid dynamic properties, *Shock waves, *Aerospace craft, Models (Simulations)

An investigation was undertaken to develop theories for predicting pressures in hypersonic flows, with special reference to low-aspect-ratio, delta-winged configurations. This report is the first of four covering our work to date and is concerned primarily with the following theoretical developments which, for the most part, are directed at the treatment of sharp-leading-edge shapes: (1) improvement of the shock-expansion method to account for wave reflections from the bow shock and from vorticity layers, the primary objective being the development of a fairly simple numerical procedure; (2) initial development of rotational, linearized, conical flow theory for analysis of the flow over three-dimensional, quasi-planar configurations; (3) extension of thin-shock-layer theory to conical shapes of smooth, but otherwise arbitrary, cross section, including an analysis of first-order shock layer structure with particular emphasis on the characteristics of crossflow stagnation surfaces (entropy layers); (4) discussion of the flow about conical wing-body combinations having a sharp corner at the wing-body juncture together with a description of a partially successful, semiempirical solution for a flat-plate delta wing. (Author)

AD-291 219
Grumman Aircraft Engineering Corp., Bethpage, N. Y.
THEORETICAL PREDICTION OF PRESSURES IN HYPERSONIC FLOW WITH SPECIAL REFERENCE TO CONFIGURATIONS HAVING ATTACHED LEADING-EDGE SHOCK. PART III. EXPERIMENTAL MEASUREMENTS OF FORCES AT MACH 8 AND PRESSURES AT MACH 21
Harold R. Mead, Frank Koch, and Stavros A. Hartofilis. Oct 62, 67p
Contract AF33(616)6400
ASD-TR-61-60, Part III; N62-14727
OTS $6.60

DESCRIPTORS: *Hypersonic flow, Pressure, Theory, Measurement, *Aerospace craft, *Wind tunnel models, *Wing-body configurations, *Delta wings, Conical bodies, Airfoils, *Shock waves,

The report presents the results of tests which are part of an experimental hypersonic research program designed to support an investigation of new theoretical means for the prediction of pressures on attached-shock configurations at hypersonic speeds. The data obtained include six-component force data at Mach 8 for seven configurations which were previously pressure tested at Mach 5 and 8 under the original program. The ranges of test variables were: angle of attack, -10° to 20°; angle of yaw, -3° to 15°; Reynolds number per foot, .8 and 2.0 x 10^6. Data were also obtained at a nominal Mach number of 21 for three pressure instrumented configurations tested earlier at Mach 5 and 8 under the original program. Pitch data were measured over the angle of attack range -5° to 20° at a Reynolds number per foot of approximately .4 x 10^6. Some of the measured pressures are compared with thin-shock-layer theory, Newtonian pressure formula, equivalent-cone and tangent-wedge approximations with the thin-shock-layer theory being generally superior in appropriate applications. (Author) (See also PB-165 075)

NASA-TN-D-2180
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC DATA ON A LARGE SEMISPAN TILTING WING WITH 0.6-DIAMETER CHORD, FOWLER FLAP, AND SINGLE PROPELLER ROTATING UP AT TIP
Marvin P. Fink, Robert G. Mitchell, and Lucy C. White.
Feb 64, 156p
N64-14729
OTS $3.00

NASA-TN-D-2002
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
AN AERODYNAMIC ANALYSIS OF SATURN 1 BLOCK 1 FLIGHT TEST VEHICLES
Fernando S. Garcia. Feb 64, 64p
N64-14392
OTS $1.75

Hydrodynamics, Hydraulics, and Hydrostatics

NYO-10427
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
DRAG ON A BODY IN NEARLY-FREE MOLECULAR FLOW
Marian H. Rose. 1 Apr 63, 61p
Contract AT(30-1)1480
MF-34
OTS $6.60

DESCRIPTORS: *Spheres, *Hydrodynamics.

AD-420 968
Saint Anthony Falls Hydraulic Lab., Univ. of Minnesota, Minneapolis
STUDIES OF THE REDUCTION OF PIPE FRICTION WITH THE NON-NEWTONIAN ADDITIVE CMC
John F. Ripken and Meir Pilch. Apr 63, 60p
Contract Nonr-710(49)
Technical paper no. 42, series B; N63-22620
OTS $1.50

DESCRIPTORS: *Pipes, *Fluid flow, Friction, *Additives, Polymers, Sodium compounds, *Cellulose.

The study extends existing data to better clarify the manner in which the addition of a small quantity of long-chain polymer chemical additive to water can remarkably reduce the frictional resistance to flow. The material sodium carboxymethylcellulose was added to fresh water and subjected to pipe friction tests under a wide range of shear rates, additive concentration, and temperature conditions. The frictional data are characterized by application of the power law expression for non-Newtonian fluids. (Author)

METALLURGY

AD-424 998
Defense Metals Information Center, Columbus, Ohio.
DESIGNATION OF ALLOYS FOR AIRCRAFT AND MISSILES. TRADE NAMES, AERONAUTICAL AND MILITARY SPECIFICATIONS, AND PRODUCERS OF STAINLESS STEELS, HIGH-ALLOY STEELS, AND SUPERALLOYS
R. M. Evans. 4 Sep 63, 63p
Contract AF33(616)7747
DMIC memo. 177, supersedes DMIC memo. 42R, AD-258 040, AD-233 728, and PB-161 192R; N64-12046
OTS $1.75

DESCRIPTORS: *Alloys, Classification, Aircraft, Guided missiles, Materials, *Aeronautics, Military requirements, Specifications, Industries, Metals, Steel, *Stainless steel, *Tool steel, Corrosion-resistant alloys, Metallurgy, *Aircraft materials.

This memoradum is a revision of DMIC Memorandum 42R, dated May 24, 1961, An effort has been made to bring the material up to date as of the end of August 1963. These tabulations were prepared with the cooperation of many producers and suppliers to assist the Defense Metals Information Center at Battelle Memorial Institute in classifying the information on metals and alloys for aircraft and missiles. Three tabulations are included: (1) Trade designations table which is a numerical and alphabetical listing of metals and alloys by trade designations and is the major table in this compilation; (2) aeronautical material specifications (AMS); and (3) hot-work tool steels. (Author)

AD-420 376
Defense Metals Information Center, Columbus, Ohio.
SOME DESIGN ASPECTS OF FRACTURE IN FLAT-SHEET SPECIMENS AND CYLINDRICAL PRESSURE VESSELS
L. R. Jackson, G. M. McClure, and J. A. Kasuba. 9 Aug 63, 27p
Contract AF33(616)7747
DMIC memo. 174; N63-22818
OTS $0.75

DESCRIPTORS: *Aluminum alloys, *Stainless steel, Tensile properties, *Fracture (Mechanics), *Sheets, Cylindrical bodies, Pressure vessels, Tables

The results of flat-sheet tensile tests made at different laboratories are re-examined and put on a comparable basis. The materials represented are 7075-T6 clad, 2024-T3 clad, 2014-T6, and 2219-T87 aluminum alloys, and 17-7PH stainless steel. Curves are presented in a form usable by designers. One investigation was concerned with the fracture strength of cylindrical pressure vessels made from 2024-T3 and 7075-T6 aluminum alloys. The data from this investigation are put on the same basis as the flat-sheet data so that comparisons can be made. Conclusions from the data studied are presented and suggestions for additional testing are made. (Author)

DRI-2102
Denver Research Inst., Colo.
DETERMINATION OF THE NIOBIUM-RICH REGION OF THE TERNARY PHASE DIAGRAMS, NIOBIUM-TUNGSTEN-HAFNIUM AND NIOBIUM-TUNGSTEN-ZIRCONIUM. Quarterly rept. no. 3.
Albert S. Yamamoto and Charles E. Lundin. Jun 63, 8p
Contract AT(11-1)1092
OTS $1.10

DESCRIPTORS: *Niobium alloys, *Hafnium alloys, *Tungsten alloys, *Zirconium alloys, *Aluminum alloys.

DRI-2105
Denver Research Inst., Colo.
INTERMEDIATE-TEMPERATURE OXIDATION OF BERYLLIDES. Quarterly progress rept.
Frank C. Perkins. 12 Jun 63, 15p
Contract AT(11-1)1092
OTS $1.60

DESCRIPTORS: *Aluminum, *Beryllium alloys, *Niobium alloys, *Zirconium alloys, *Oxidation.

DRI-2104
Denver Research Inst., Colo.
AN INVESTIGATION OF THE EFFECT OF METALLIC ADDITIONS UPON THE OXIDATION RESISTANCE OF TITANIUM-MODIFIED $NbAl_3$. Quarterly progress rept. no. 3, 1 Mar-31 May 63
Walter Wheatfall and Donald T. Klodt. Jun 63, 28p
Contract AT(11-1)1092
OTS $2.60

DESCRIPTORS: *Aluminum alloys, *Niobium alloys, *Titanium alloys, *Oxidation.

AD-296 223
Explosiform, Inc., Park Forest, Ill.
DIRECT CONTACT EXPLOSIVES METALFORMING. Final technical engineering rept. on Low Density Explosive Forming
Jacob Savitt. Oct 62, 28p
Contract AF33(657)9631
ASD-TDR-62-1035
OTS $2.60

DESCRIPTORS: *Explosive forming, *Tetryl, *Guanidines, *Nitro radicals, Density, Metals, Detonations, Pressure,

The technical foundation of employing high explosives in direct contact with metal workpieces for non-destructive metal forming was investigated. Low density nitroguanidine and low density tetryl charges were detonated in direct contact with mild steel workpieces in simple plate and tube bulging experiments. Plates and tubes were successfully bulged without significant surface damage by direct contact detonation of nitroguanidine explosives charges which varied in density from about 0.1 to about 0.5 gm/cc. Tetryl charges at a density of 0.88 gm/cc (the lowest density obtainable) caused serious surface pitting and spalling when detonated in direct contact with the workpiece. Successful bulges from 1 1/2 to 18 inches in diameter were obtained without significant contact surface damage with mild steel plates ranging in thickness from 1/16 to 5/8 inches. The practical foundation of direct contact low density low detonation pressure detonating high explosive metal forming was conclusively established. Quantitative effects of explosives weight and density upon direct contact plate and tube bulging were determined for nitroguanidine explosives charges and mild steel workpieces. (Author)

HW-79350
Hanford Atomic Products Operation, Richland, Wash.
OXIDATION OF A NICKEL-2% ThO_2 ALLOY AND THE LOGARITHMIC RATE LAW OF OXIDATION
D. A. Jones and R. E. Westerman. Oct 63, 32p
Contract AT(45-1)1350
OTS $0.75

AD-426 964 repriced
IIT Research Inst., Chicago, Ill.
EMBRITTLEMENT OF METALS BY ORGANIC LIQUIDS
Summary rept. 1 Dec 62-30 Nov 63. 2 Jan 64, 42p
Contract DA11-022-ORD-3108
IITRI-B183B2-4
OTS $1.25

DESCRIPTORS: *Steel, *Aluminum, Tensile properties, *Fracture (Mechanics), Brittleness, Organic materials, Water, Alcohols, Glycols, Ethers, Aldehydes.

High-strength steel and aluminum are shown to be embrittled in notched fatigue testing in the presence of water, alcohols, glycols, ethers, and aldehydes. It is shown that longer carbon chains, branching molecular shapes, and closed rings reduce the degree of embrittlement while multiplicity of (-OH) or (-O-) groups enhance it. By a variety of experiments and deductions, water is shown to behave more like a zero chain length organic molecule rather than an electrolytic medium. (Author) (See also AD-294 459)

ARF-B198-42
[IIT Research Inst.,] Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS. Quarterly rept. for 1 Apr-30 Jun 63
D. Weinstein and F. C. Holtz. [1963] 16p
Contract AT(11-1)578
EURAEC-713
OTS $1.60

DESCRIPTORS: *Corrosion.

UCRL-11116
Lawrence Radiation Lab., Univ. of California, Berkeley.
DIFFUSION OF IRON INTO SODIUM DISILICATE GLASS
Marcus P. Borom. Master's thesis. 12 Nov 63, 41p
Contract W7405-eng-48
OTS $1.00

UCRL-10383
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE FORMATION OF POROSITY DURING DIFFUSION PROCESSES IN METALS
Dennis M. Maher. Master's thesis. Sep 62, 71p
Contract W7405-eng-48
OTS $1.75

LADC-5785
Los Alamos Scientific Lab., N. Mex.
METALLOGRAPHY OF POWDER MATERIALS
T. I. Jones. [1962] 24p
Contract W7405-eng-36
OTS $2.60

DESCRIPTORS: *Powders, Metallography.

LADC-5786
Los Alamos Scientific Lab., N. Mex.
METALLOGRAPHY OF THERMIONIC CONVERSION COMPONENTS
T. L. Jones. [1962] 18p
Contract W7405-eng-36
OTS $1.60

DESCRIPTORS: *Thermionic emission.

NMI-2116
Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. for Mar 63, 28 May 63, 27p
Contract AT(30-1)2784
OTS $2.60

DESCRIPTORS: *Beryllium, *Crystals, *Alloys, *Metallurgy.

NMI-2117
Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. for Apr 63 2 Jul 63, 35p
Contract AT(30-1)2784
OTS $3.60

DESCRIPTORS: *Beryllium, *Crystals, *Silicon, *Niobium alloys, *Rhenium alloys, *Tantalum alloys, *Tungsten alloys.

ORNL-TM-521
Oak Ridge National Lab., Tenn.
METALLOGRAPHIC EXAMINATION OF PYROLYTIC-CARBON COATED AND UNCOATED URANIUM CARBIDE PARTICLES
C. K. H. DuBose. 25 Jun 63, 127p
Contract W7405-eng-26
OTS $10.10

DESCRIPTORS: *Metallography, *Reactor fuel elements, *Uranium, *Carbides.

TID-18791
Rensselaer Polytechnic Inst., Troy, N. Y.
METALLURGICAL STUDIES OF ZIRCONIUM AND THORIUM AND OF THE ALLOYING BEHAVIOR OF RARE EARTH-TRANSITION METAL SYSTEMS. Progress rept. Jun 63, 10p
Contract AT(30-1)2159
OTS $1.10

DESCRIPTORS: *Thorium, *Zirconium, *Rare earths, *Lithium.

SCTM-59-63(25)
Sandia Corp., Albuquerque, N. Mex.
STRESS DETECTION BY INFRARED INSPECTION. Experimental data rept.
L. J. Klamerus and J. C. Dresser. Mar 63, 60p
Contract AT(29-1)789
OTS $5.60

DESCRIPTORS: *Infrared spectroscopy, *Aluminum, *Steel, *Copper, *Cast iron.

TID-18998
Savannah River Lab., Aiken, S. C.
METALLORGAPHY OF URANIUM CONTAINING SMALL ADDITIONS OF IRON, SILICON, OR ALUMINUM
C. L. Angerman and M. R. Louthan, Jr. May 63, 13p
Contract AT(07-2)1
OTS $1.60

DESCRIPTORS: *Uranium, *Metallography, *Aluminum, *Iron, *Silicon.

TID-18815
Savannah River Lab., Aiken, S. C.
A SPECIMEN DESIGN FOR OBTAINING AVERAGE GROWTH INDICES IN URANIUM TUBES CONTAINING TEXTURE GRADIENTS
B. G. LeFevre and E. F. Sturcken. [Jun 63] 12p
Contract AT(07-2)1
OTS $1.60

DESCRIPTORS: *Uranium.

NASA-TN-D-2228
Syracuse Univ. Research Inst., N. Y.
ADHESION BETWEEN ATOMICALLY CLEAN SURFACES
Douglas V. Keller, Jr. Feb 64, 25p
Grant NsG-159-61
N64-14730
OTS $0.75

Ferrous Metals

EURAEC-320
Battelle Memorial Inst., Geneva (Switzerland).
THE EFFECT OF RADIATION ON THE DUCTILE-BRITTLE TRANSITION IN PRESSURE VESSEL STEELS. Quarterly rept. no. 5, 1 Jan-31 Mar 62.
E. Anderson, W. Bollmann, D. King, M. Malone, and J. Spreadborough. 1962, 125p
Contract 041-60-12-RDS
ORS $10.10

DESCRIPTORS: *Iron, *Ductility

AD-420 873
Defense Metals Information Center, Columbus, Ohio
CONSIDERATION OF STEELS WITH OVER 150,000 PSI YIELD STRENGTH FOR DEEP-SUBMERGENCE HULLS
G. K. Manning and D. C. Martin. 16 Aug 63, 15p
Contract AF33(616)7747
DMIC memo. 175; N63-22819
OTS $0.50

DESCRIPTORS: *Steel, Nickel alloys, *Austenite, *Ship plates, Submarine hulls, Mechanical properties.

Three types of ferrous materials that deserve to be considered as future hull materials have been discussed. The present state of knowledge can be summarized this way: quenched and tempered steels with 0.20 per cent carbon and yield strengths of about 170,000 psi can probably be developed into a useful hull material in less time than either of the other two classes. Maraging steels have great potential if it is possible to improve their toughness. The stable austenitic steels appear to offer the greatest potential, but less in known about these than about the other two classes of materials. (Author)

AD-425 714
Defense Metals Information Center, Columbus, Ohio.
THE CURRENT STATUS OF THE WELDING OF MARAGING STEELS
R. M. Evans and R. E. Monroe. 16 Oct 63, 32p
Contract AF33(616)7747
DMIC memo. 182
OTS $1.00

DESCRIPTORS: *Steel, *Welding, *Nickel alloys, Heat treatment, Martensite,

Among the various types of maraging steel, the greatest development and evaluation effort has been expended on the 18 per cent nickel variety. This type combines higher strengths and simpler heat treatments with greater toughness than the other types of maraging steel The 25 per cent nickel alloy has not received much attention because it requires a rather complicated heat treatment to achieve ultrahigh strength. Carefully designed heat-treatment schedules and cold working of welds in the 25 per cent maraging steel have produced strengths equal to that of the base metal, but, the ductility was low. Utilization of the 20 per cent nickel alloy suffers from the same difficulties. There is little question that welds with satisfactory strength can be made in 18 per cent nickel maraging steels in a wide thickness range. With proper choice of filler-metal composition, welding speed, cleaning procedure, shielding, and other welding variables, porosity-free and crack-free welds are obtained by most commercial welding processes. (Author)

AD-425 124
Defense Metals Information Center, Columbus, Ohio.
THE PROBLEM OF HYDROGEN IN STEEL
A. R. Elsea and E. E. Fletcher. 1 Oct 63, 39p
Contract AF33(616)7747
DMIC memo. 180; N64-12309
OTS $1.00

DESCRIPTORS: *Steel, *Hydrogen, *Brittleness, Failure (Mechanics), Mechanical properties, Iron, *Hydrogen embrittlement.

This memorandum is an introduction to the problem of delayed, brittle failures associated with hydrogen in steel, particularly high-strength steel. It is intended to help the steel user determine if he has such a problem. The effects of hydrogen on the mechanical properties of steel are dealt with, and the behavior of material susceptible to delayed, brittle failure is described. Also, the effects of such factors as strength level, magnitude of applied stress, hydrogen content, steel composition, test temperature, and strain rate on hydrogen embrittlement and the susceptibility to hydrogen-induced, delayed, brittle failure are discussed. Possible sources of hydrogen in steel and the types of tests useful in determining the susceptibility to delayed failure are outlined. (Author)

MSAR-63-91
MSA Research Corp., Callery, Pa.
EFFECT OF 1200°F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PHYSICAL PROPERTIES OF MATERIALS. Progress rept. no. 33 for May 63.
21 Jun 63, 46p
Contract AT(11-1)765
OTS $4.60

DESCRIPTORS: *Stainless steel, *Sodium, *Air, *Helium, *Chromium, *Molybdenum,

AD-425 125
Defense Metals Information Center, Columbus, Ohio.
REPORT ON THE THIRD MARAGING STEEL PROJECT REVIEW
A. M. Hall. 7 Oct 63, 59p
Contract AF33(616)7747
DMIC memo. 181; N64-12310
OTS $1.50

DESCRIPTORS: *Steel, *Nickel alloys, Welding, Mechanical properties, Material forming, Grain structures (Metallurgy), Abstracts.

Abstracts are presented on papers on the evaluation and mechanical properties of 18% nickel maraging steel.

AD-420 591
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio
EFFECTS OF THERMAL-MECHANICAL PROCESSING VARIABLES ON SHORT-TIME 3000°F TENSILE PROPERTIES OF TUNGSTEN PLUS 0.6 PERCENT COLUMBIUM ALLOY
Vincent DePlerre and George Saul. Aug 63, 35p
ASD-TDR-63-782
OTS $1.00

DESCRIPTORS: *Tungsten alloys, *Niobium alloys, Tensile properties, Microstructure, Heat treatment.

The effects of thermal-mechanical processing variables on short-time 3000°F tensile properties of tungsten + 0.6 percent columbium alloy were determined by correlating both tensile properties and thermal-mechanical variables with microstructure and cold work condition of this alloy. From these correlations the spread in 3000°F tensile and yield strength values (22,000 to 63,310 psi and 10,500 to 61,500 psi respectively) is attributed to variations in processing factors and time at 3000°F during tensile testing. The correlations also serve as a guide for processing the alloy and for evaluating the alloy suitability for 3000°F service application. (Author)

AD-424 683

Materials Research Corp., Orangeburg, N. Y
THE MECHANICAL PROPERTIES OF TANTALUM W WITH SPECIAL REFERENCE TO THE DUCTILE-BRITTLE TRANSITION. Final rept., 1 Apr 62-1 Apr 63, on Metallic Materials
G. Abowitz and R. A. Burn. May 63, 65p
Contract AF33(616)7173
ASD-TR-61-203, Part III
OTS $1.75

DESCRIPTORS: *Tantalum alloys, *Molybdenum alloys, *Brittleness, *Ductility, Hydrogen, Mechanical properties, Twinning (Crystallography), Stresses.

The tensile behavior of single phase tantalum-hydrogen alloys and tantalum-molybdenum alloys containing dilute additions of molybdenum has been studied as a function of grain size and alloying addition. It was observed that σ_i the lattice friction stress, was essentially independent of hydrogen content at room temperature whereas k_y, which was presumably a measure of the solute-dislocation interaction, was observed to increase by the absorption of hydrogen into tantalum. No evidence of mechanical twinning was found in any of the Ta-H alloys either at 25°C or at -196°C. The addition of small amounts of Mo to Ta resulted in an increase in K_y at 25°C which can be attributed to a Mo-dislocation interaction. The rate of increase of k_y per at.% Mo is greater than expected on the basis of a linear variation in ky between the pure elements. It was also observed that σ_i is unaffected, at 25°C, by the addition of small amounts of Mo. Mechanical twinning was observed in several Ta-Mo alloys at -196°C, but none was observed for these same alloys at 25° C. A large increase in ductility accompanied the twinning. (Author) (See also AD-403 074)

EURAEC-318
Battelle Institut, Frankfurt/Main (West Germany).
MICROGRAVIMETRIC INVESTIGATION INTO THE MECHANISMS OF CORROSION OF REACTOR MATERIALS IN THE PRESENCE OF NUCLEAR RADIATION. Quarterly rept. no. 1, 1 Jan-31 Mar 62. 1962, 33p
Contract 071-62-1-RDD
OTS $3.60

DESCRIPTORS: *Balances, *Chromium, *Iron, *Nickel, *Alloys, *Corrosion

EURAEC-376
Battelle Institut, Frankfurt/Main (West Germany).
MICROGRAVIMETRIC INVESTIGATION INTO THE MECHANISMS OF CORROSION OF REACTOR MATERIALS IN THE PRESNECE OF NUCLEAR RADIATION. Quarterly rept. no. 2, 1 Apr-30 Jun 62. 1962, 23p
Contract 071-62-12-RDD
ORS $1.60

DESCRIPTORS: *Reactor materials, *Corrosion

BMI-X-227
Battelle Memorial Inst., Columbus, Ohio.
CORROSION RESISTANCE OF NICKEL-BASE ALLOYS IN A NaF-LiF-BeF_2-ZrF_4 SALT MIXTURE UNDER HYDROFLUORINATOR CONDITIONS WITH ZIRCALOY-2 DISSOLVING AT 500 C
P. D. Miller, E. F. Stephan, W. N. Stiegelmeyer, and F. W. Fink. 25 Apr 63, 13p
Contract W7405-eng-92
OTS $1.60

DESCRIPTORS: *Nickel, *Corrosion, *Iron alloys, *Chromium alloys, *Molybdenum alloys

WAPD-T-1567
Bettis Atomic Power Lab., Pittsburgh, Pa.
EFFECTS OF SILICON, NITROGEN, AND OXYGEN ON THE CORROSION AND HYDROGEN ABSORPTION PERFORMANCE OF ZIRCALOY-2
S. Kass, J. D. Grozier, and F. L. Shubert
Jan 63, 69p
Contract AT(11-1)GEN-14
OTS $6.60

DESCRIPTORS: *Corrosion, *Nitrogen, *Oxygen, *Silicon, *Hydrogen, *Sorption.

EURAEC-675
Centre Belge d'Etude de la Corrosion, Brussels.
ON THE BEHAVIOR OF ALLOY STEELS IN CHLORIDE SOLUTIONS. I. INFLUENCE OF CHLORIDE AND OXIDIZING AGENTS IN THE PRESENCE OF BICARBONATE 1962, 71p
Contract 006-60-3 RDB
EUR-34.f
OTS $7.60

DESCRIPTORS: *Nickel, *Chromium, *Steel, *Corrosion, *Sodium, *Chlorides, *Carbonates.

EURAEC-678
Centre Belge d'Etude de la Corrosion, Brussels.
ON THE BEHAVIOR OF STAINLESS STEELS IN SULPHURIC SOLUTION. IV. EXPERIMENTAL RESEARCH. Special technical rept. Sep 62, 40p
Contract 006-60-3 RDB
EUR-37.f
OTS $3.60

DESCRIPTORS: *Stainless steel, *Corrosion, *Sulfuric acid.

EURAEC-679
Centre Belge d'Etude de la Corrosion, Brussels.
ON THE BEHAVIOR OF STAINLESS STEELS IN SULPHURIC SOLUTION. V. BIBLIOGRAPHICAL STUDY
C. Mertens. Sep 62, 46p
Contract 006-60-3-RDB
EUR-38.f; CEBELCOR-RT/107
OTS $4.60

DESCRIPTORS: *Bibliographies, *Stainless steel, *Corrosion, *Sulfuric acid

EURAEC-676
Centre Belge d'Etude de la Corrosion, Brussels.
ON THE BEHAVIOR OF STEEL ALLOYS IN SODIUM CHLORIDE. II. INFLUENCE OF SODIUM BICARBONATES AND SULPHATES AT 20°C
J. Klimzak-Mathiew, J. Meunier, M. Pourbaix, and C. Vanleugenhague. 1962, 24p
Contract 006-60-3-RDB
EUR-35.f; CEBELCOR RT/104
OTS $2.60

DESCRIPTORS: *Steel, *Corrosion, *Sodium compounds, *Chlorides

EURAEC-677
Centre Belge d'Etude de la Corrosion, Brussels.
THE BEHAVIOR OF STEEL ALLOYS IN SODIUM CHLORIDE SOLUTIONS. III. INFLUENCE OF TEMPERATURE ON "RUPTURE" AND "PROTECTION" POTENTIALS OF STEELS AND ON SODIUM CHLORIDE CONCENTRATIONS FOR "RUPTURE" AND "PROTECTION" (SODIUM BICARBONATE SOLUTIONS). Special technical rept. 1962, 32p
Contract 006-60-3 RDB
EUR-36.f
OTS $3.60

DESCRIPTORS: *Steel, *Sodium compounds, *Chlorides

DPST-63-71-1
Du Pont de Nemours (E. I.) and Co., Wilmington, Del.
APPLICATION OF THE ELECTRON MICROPROBE TO THE STUDY OF ZIRCALOY CORROSION FILM. Quarterly progress rept. for Jan-Mar 63. May 63, 13p
Contract AT(07-2)1
OTS $1.60

DESCRIPTORS: *Corrosion and Electron microscopy.

TID-18773
Institute for the Study of Rate Processes, Univ. of Utah, Salt Lake City.
CORROSION OF ZIRCONIUM AND ZIRCALOY-2 IN FUSED NITRATE-NITRITE. Technical rept. no. 43
Larry LaVon Anderson and George Richard Hill.
31 Jan 63, 94p
Contract AT(11-1)1144
OTS $8.60

DESCRIPTORS: *Zirconium, *Corrosion, *Potassium, *Sodium, *Nitrates, *Nitrites.

ORNL-TM-539
Oak Ridge National Lab., Tenn.
A SURVEY OF THE CORROSION OF MARTENSITIC AND FERRITIC STAINLESS STEELS IN PRESSURIZED WATER
R. J. Beaver and C. F. Leitten, Jr. 16 Jul 63, 34p
Contract W7405-eng-26
OTS $3.60

DESCRIPTORS: *Stainless steel, *Corrosion, *Carbon, *Steel, Chromium.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-18776
Arkansas Univ., Fayetteville.
2.95-Mev AND 14.8-Mev NEUTRON-INDUCED FISSION OF Th^{232}
K. M. Broom. [1963] 46p
Contract AT(40-1)1313
OTS $4.60

DESCRIPTORS: *Thorium, *Isotopes, *Fission products *Fast neutrons.

NAA-SR-MEMO-8465
Atomics International, Canoga Park, Calif.
REMOVAL OF FISSION PRODUCT ELEMENTS BY GASEOUS CHLORIDE TREATMENT
L. J. Groce. 13 May 63, 12p
Contract AT(11-1)GEN-8
OTS $1.60

DESCRIPTORS: *Fission products, *Oxides, *Chlorine.

TID-18904
Bell Telephone Lab., Inc., Murray Hill, N. J.
SYSTEMATICS OF MOSSBAUER ISOMER SHIFTS OF IRON-ORGANIC COMPOUNDS
R. H. Herber, R. B. King, and G. K. Wertheim. [1963] 32p Prepared in cooperation with Rutgers Univ. and Mellon Inst. of Industrial Research.
Contract AT(30-1)2472
OTS $3.60

DESCRIPTORS: *Iron compounds, Organic compounds,

BNL-6948
Brookhaven National Lab., Upton, N. Y.
THE SYNTHESIS OF XENON COMPOUNDS IN IONIZING RADIATION
D. R. MacKenzie and R. H. Wiswall. [1963] 22p
Contract AT(30-2)GEN-16
OTS $2.60

DESCRIPTORS: *Fluorides, *Xenon compounds

TID-18864
California Univ., Los Angeles. School of Medicine.
UPTAKE OF RADIOACTIVE MATERIALS FROM A NUCLEAR REACTOR BY SMALL MAMMALS AT THE NEVADA TEST SITE
Frederick B. Turner, Bruce Kowalewsky, Richard H. Rowland, and Kermit H. Larson. Jun 63, 13p
Contract AT(04-1)GEN-12
OTS $1.60

DESCRIPTORS: *Radioactive fallout, *Beta particles, *Mammals, *Radiological contamination.

TID-18961
Carnegie Inst. of Tech., Pittsburgh, Pa.
NUCLEAR CHEMISTRY RESEARCH AT CARNEGIE INSTITUTE OF TECHNOLOGY 1962-1963. Progress rept. 1 Jun 63, 105p
Contract AT(30-1)844
OTS $9.10

DESCRIPTORS: *Radiochemistry

TID-18788
Carnegie Inst. of Tech., Pittsburgh, Pa.
NUCLEAR CHEMISTRY RESEARCH OF HIGH-ENERGY NUCLEAR REACTIONS AT CARNEGIE INSTITUTE OF TECHNOLOGY, 1962-1963. Annual progress rept. 1 Jun 62-1 Jun 63 1 Jun 63, 49p
Contract AT(30-1)2897 and Grant NSF-G18825
OTS $4.60

DESCRIPTORS: *Proton reactions, *Radiochemistry.

NYO-10387
Columbia Univ., New York.
COMPARISONS OF REACTIONS OF COPPER-63 COMPOUND NUCLEI FORMED BY ALPHA-PARTICLE, PROTON, AND CARBON-ION BOMBARDMENTS
Carole M. Stearns. 1962, 84p
Contract AT(30-1)1019
CU-34-63-AEC-1019-CHEM
OTS $8.10

DESCRIPTORS: *Cobalt, *Nickel, *Vanadium, *Protons, *Alpha particles, *Carbon, *Copper, *Isotopes.

TID-18812
Delaware Univ., Newark.
PRIMARY CHEMICAL PROCESS IN THE RADIOLYSIS OF LIQUIDS. Annual progress rept. for 15 Sep 62-14 Sep 63
Conrad N. Trumbore. 7 Jun 63, 9p
Contract AT(30-1)2668
OTS $1.10

DESCRIPTORS: *Radiation chemistry.

SRO-70
Georgia Inst. of Tech., Atlanta, Engineering Experiment Station.
DEVELOPMENT OF SEPARATION PROCEDURES FOR RADIOACTIVE MATERIALS. SODIUM, BARIUM, CALCIUM, AND STRONTIUM DISTRIBUTION COEFFICIENTS IN A DI-2-ETHYL HEXYL PHOSPHORIC ACID SOLVENT EXTRACTION SYSTEM. Annual technical status rept. no. 3, 1 Apr 61-31 Mar 62.
Robert J. Klett. 15 May 62, 249p
Contract AT(38-1)202
OTS $16.00

DESCRIPTORS: *Solvent extraction, *Phosphoric acids, *Sodium, *Barium, *Calcium, *Strontium, *Separation.

KR-44
Institutt for Atomenergi, Kjeller (Norway)
MEASUREMENT OF RESONANCE ABSORPTION IN U^{238} USING A CHEMICAL SEPARATION TECHNIQUE FOR ISOLATION OF Np^{239}.
J. Thomassen and H. H. Windsor. Mar 63, 37p
OTS $3.60

DESCRIPTORS: *Neptunium, *Isotopes, *Dysprosium, *Uranium, *Neutron capture, *Research reactors.

UCRL-10741
Lawrence Radiation Lab., Univ. of California, Berkeley.
CHARGE DISTRIBUTIONS OF PRODUCTS OF REACTIONS BETWEEN COMPLEX NUCLEI
Naftali H. Steiger. 5 Apr 63, 32p
Contract W7405-eng-48
OTS $3.60

DESCRIPTORS: *Nuclei, *Ions, *Spallation, *Praseodymium, *Isotopes, *Oxygen,

UCRL-10767
Lawrence Radiation Lab., Univ. of California, Berkeley.
EFFECT OF ANGULAR MOMENTUM ON NEUTRON EMISSION FROM Tb AND Dy COMPOUND NUCLEI
Gabriel N. Simonoff and John M. Alexander. Apr 63, 19p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Praseodymium, *Isotopes, *Neodymium, *Cerium.

UCRL-10775
Lawrence Radiation Lab., Univ. of California, Berkeley.
EQUILIBRIUM SHAPES OF A ROTATING CHANGED DROP AND CONSEQUENCES FOR HEAVY-ION-INDUCED NUCLEAR REACTIONS
S. Cohen, F. Plasil, and W. J. Swiatecki. 29 Apr 63, 20p Prepared in cooperation with Argonne National Lab.
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Nuclei, *Ions, *Nuclear reactions.

UCRL-10695
Lawrence Radiation Lab., Univ. of California, Berkeley
ESTIMATES OF FISSION-FRAGMENT KINETIC-ENERGY DISTRIBUTIONS ON THE BASIS OF THE LIQUID-DROP MODEL
James Rayford Nix. 1 Apr 63, 30p
Contract W7405-eng-48
OTS $2.60

DESCRIPTORS: *Fission products.

UCRL-11097
Lawrence Radiation Lab., Univ. of California, Berkeley.
FRACTIONAL RELEASE OF A TRACER ELEMENT THROUGH A MOVING BOUNDARY
Stephen D. Lowe. Master's thesis. 30 Oct 63, 100p
Contract W7405-eng-48
OTS $2.25

UCRL-10765
Lawrence Radiation Lab., Univ. of California, Berkeley.
HEAVY ION COULOMB EXCITATION OF DEFORMED NUCLEI
F. S. Stephens, B. Elbek, and R. M. Diamond
Apr 63, 29p
Contract W7405-eng-48
OTS $2.60

DESCRIPTORS: *Nuclear energy levels,

UCRL-10825
Lawrence Radiation Lab., Univ. of California, Berkeley.
INELASTIC SCATTERING OF 166-MeV O^{16} IONS BY Ta^{181}
A. Isoya, H. E. Conzett, E. Hadjimichael, and E. Shield. May 61, 18p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Tantalum, *Isotopes, *Scattering, *Oxygen.

UCRL-10689
Lawrence Radiation Lab., Univ. of California, Berkeley.
NEUTRON SPECTRA FROM HEAVY-ION BOMBARDMENT OF GOLD
William G. Simon. 12 Apr 63, 21p
Contract W7405-eng-48
OTS $2.60

DESCRIPTORS: *Oxygen, *Isotopes, *Gold, *Neutrons

UCRL-10769
Lawrence Radiation Lab., Univ. of California, Berkeley.
PHASE SHIFT ANALYSIS OF HEAVY ION SCATTERING
H. E. Conzett, A. Isoya, and E. Hadjimichael. Apr. 63, 13p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Ions, *Scattering, *Carbon, *Isotopes *Tantalum.

UCRL-11074
Lawrence Radiation Lab., Univ. of California, Berkeley.
PURIFICATION METHODS USED FOR THE MASS-SPECTROMETRIC STUDY OF FISSION OF U^{235} AND U^{238} AT MODERATE ENERGIES
Roger C. Pettersen. Master's thesis. Oct 63, 23p
Contract W7405-eng-48
OTS $0.50

UCRL-10772
Lawrence Radiation Lab., Univ. of California, Berkeley.
TERNARY FISSION OF HEAVY COMPOUND NUCLEI
P. B. Price, R. L. Fleischer, R. M. Walker, and E. L. Hubbard. Apr 63, 11p Prepared in cooperation with General Electric Research Lab.
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Nuclei, *Fission.

UCRL-10766
Lawrence Radiation Lab., Univ. of California, Berkeley
TOTAL REACTION CROSS SECTIONS FOR HEAVY IONS
Bruce Wilkins and George Igo. Apr 63, 14p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Carbon, *Oxygen, *Isotopes, *Nuclei, *Nuclear reactions, *Aluminum.

MLM-914
Mound Lab., Miamisburg, Ohio.
PROCESSING AND PROPERTIES OF POLONIUM-208
G. L. Fox, G. D. Nelson, and W. H. Powers.
17 Jan 64, 26p
Contract AT(33-1)GEN-53
OTS $0.50

CU(PNPL)228
Pegram Nuclear Physics Labs., Columbia Univ., New York.
PEGRAM NUCLEAR PHYSICS LABORATORIES PROGRESS REPORT, OCTOBER-DECEMBER, 1962
W. W. Havens, Jr. [1963] 46p
Contract AT(30-1)GEN-72
OTS $4.60

DESCRIPTORS: *Nuclear physics laboratories.

RAI-113
Radiation Applications, Inc., Long Island City, N. Y.
FOAM SEPARATION. Quarterly progress rept., 1 Jan-31 Mar 63
Eliezer Rubin and Ernest Schonfeld. 12 Jun 63, 14p
Contract W7405-eng-26
OTS $1.60

RRL-113
Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
ESR STUDIES OF ENERGY TRANSFER IN ETHANE-ETHYLENE MIXTURES
Richard W. Fessenden and Robert H. Schuler.
6 Jun 63, 16p
Contract AT(30-1)2310
OTS $1.60

DESCRIPTORS: *Ethanes, *Electron spin resonance, *Ethylenes.

TID-18905
Rutgers Univ., New Brunswick, N. J.
CHEMICAL EFFECTS OF NUCLEAR TRANSFORMATIONS
R. H. Herber. [1963] 20p
Contract AT(30-1)2472
OTS $1.60

DESCRIPTORS: *Conferences, *Radiation effects, *Radiation chemistry, *Radiochemistry.

NDA-MEMO-2123-1
United Nuclear Corp., White Plains, N. Y.
INCLUSION OF SPLITTING AS A FUNCTION OF ENERGY, PHOTONEUTRON PRODUCTION AND VARIANCE CALCULATION IN PROGRAM 18-0 (MONSTER)
G. Rabinowitz. 18 Apr 60, 40p
Contract AT(30-1)2303
OTS $3.60

DESCRIPTORS: *Neutrons, *Programming (Computers), *Photonuclear reactions.

Elementary Particles

BNL-6957
Brookhaven National Lab., Upton, N. Y.
Y* PRODUCTION IN P-P COLLISIONS
A. M. Thornkike. [1962] 17p
Contract AT(30-2)GEN-16
OTS $1.60

DESCRIPTORS: *Protons, *Hyperons, *Pair production, *Antiprotons.

HW-SA-2870
Hanford Atomic Products Operation, Richland, Wash.
COSMIC-RAY NEUTRON MEASUREMENTS
R. A. R. Kent. 25 May 63, 11p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: *Neutrons, *Cosmic rays.

UCRL-10693
Lawrence Radiation Lab., Univ. of California, Berkeley.
EMISSION OF CHARGED PARTICLES IN HEAVY ION INTERACTIONS
Donald V. Reames. 12 Apr 63, 17p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Oxygen, *Isotopes, *Aluminum, *Nickel, *Gold, *Silver, *Protons, *Deuterons, *Tritons, *Alpha particles, *Helium, *Lithium,

UCRL-10842
Lawrence Radiation Lab., Univ. of California, Berkeley.
WHAT IS THE NUCLEON?
Geoffrey F. Chew. 24 Jun 63, 18p Prepared in cooperation with Cambridge Univ.
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Nucleons

PPAD-482D
Princeton-Pennsylvania Accelerator, Princeton Univ., N. J.
TWO AND THREE-BODY KINEMATICS PROGRAMS AND SUBROUTINES: TRAM 2 AND TRAM 3.
I. L. Rosner, 15 Mar 63, 25p
Contract AT(30-1)2137
OTS $2.60

DESCRIPTORS: *Elementary particles, *Programming (Computers).

NYO-10268
Rochester Univ., N. Y.
CONSEQUENCES OF SU_3 INVARIANCE
E. C. G. Sudarshan. 27 Apr 63, 50p
Contract AT(30-1)875
OTS $4.60

DESCRIPTORS: *Elementary particles.

Instruments and Installations

TID-17829
Argonne National Lab., Ill.
A STUDY OF DEFLECTION METHODS FOR 50 MEV PROTON BEAM
J. F. Mech and S. W. Zimmerman. 25 Sep 62, 38p
Contract W31-109-eng-38
OTS $3.60

DESCRIPTORS: *Proton beams, *Deflection, *Magnets,

BNL-6189
Brookhaven National Lab., Upton, N. Y.
A COMPUTER PROGRAM TO OPTIMIZE MAGNETS IN A BEAM TRANSPORT SYSTEM
W. F. Baker. 18 Jul 62, 5p
Contract AT(30-2)GEN-16
OTS $1.10

DESCRIPTORS: *Charged particles, *Particle accelerators, *Particle beams,

BNL-7048
Brookhaven National Lab., Upton, N. Y.
AN ELECTRONIC DIGITIZING SYSTEM FOR OPTICAL SPARK CHAMBER DATA
E. J. Rogers. 23 May 63, 23p
Contract AT(30-2)GEN-16
OTS $2.60

BNL-7033
Brookhaven National Lab., Upton, N. Y.
Mu-p SCATTERING EXPERIMENT NUMBER 26: TRIGGER AND DRIVE CIRCUITS
Michael J. Tannenbaum. May 63, 67p Prepared in cooperation with Columbia Univ.
Contract AT(30-2)GEN-16
OTS $6.60

DESCRIPTORS: *Circuits, *Protons, *Muons, *Scattering

BNL-7091
Brookhaven National Lab., Upton, N. Y.
STORAGE RINGS FOR ULTRA-HIGH ENERGIES
E. D. Courant. 14 May 63, 34p
Contract AT(30-2)GEN-16
OTS $3.60

DESCRIPTORS: *Particle accelerators.

EURAEC-403
Centre d'Etude de l'Energie Nucleair, Mol (Belgium).
SOLID STATE NEUTRON DETECTOR. Quarterly rept. no. 7, 1 Apr-30 Jun 62. 1962, 13p
Contract 079-61-10-RDB
R. 2141
OTS $1.60

DESCRIPTORS: *Neutron detectors, *Silicon compounds, *Carbides, *Single crystals.

TID-18783
Colorado Univ., Boulder.
OPERATING EXPERIENCE WITH THE UNIVERSITY OF COLORADO CYCLOTRON
J. J. Kraushaar, D. A. Lind, M. E. Rickey, and W. R. Smythe. [1963] 19p
Contract AT(11-1)535
OTS $1.60

DESCRIPTORS: *Cyclotrons

RIB-45
David Sarnoff Research Center, Princeton, N. J.
DEVELOPMENT OF HIGH SPEED ELECTRON ACCELERATOR STRUCTURES. Interim rept. no. 12, 1 Aug 56-1 Nov 60 47p
Contract AT(30-1)1958
J. A. Baicker, T. S. Chen, R. M. Matheson, and A. H. Sommer
OTS $4.60

DESCRIPTORS: *Electron tubes, *Timing circuits, *Electric discharges.

HW-72512
Hanford Atomic Products Operation, Richland, Wash.
SCINTILLATING GLASSES FOR ALPHA COUNTING
U. L. Upson. 29 Jan 62, 21p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Glass, *Alpha particle detectors, *Scintillation counters,

UCRL-7571
Lawrence Radiation Lab., Univ. of California, Livermore.
HAZARDS CONTROL. Quarterly rept. no. 14, Jul-Sep 63.
Contract W7405-eng-48
OTS $1.75

TID-18762
New York Univ., N. Y. Graduate School of Arts and Sciences.
THIN WALL ION CHAMBERS FOR LOW LEVEL RADIATION ENVIRONMENTS. Interim technical rept.
M. H. Shamos, A. Liboff, and J. Siderowitz. May 63, 27p
Contract AT(30-1)1704
OTS $2.60

DESCRIPTORS: *Ionization chambers.

DP-856
Savannah River Lab., Aiken, S. C.
A SENSITIVE RADIATION MONITOR FOR A LARGE LABORATORY AREA
LeConte Cathey and Richard A. Moyer. Nov 63, 11p
Contract AT(07-2)1
OTS $0.50

Isotope Separation

UCOL-P-516
Colorado Univ., Boulder.
THE COLUTRON: A ZERO DEFLECTION ISOTOPE SEPARATOR
L. Wahlin. [1963] 14p
Contract AT(11-1)535
OTS $1.60

DESCRIPTORS: *Isotope separation.

NYO-8772
Rutgers Univ., New Brunswick, N. J.
SEPARATION AND EXCHANGE OF ISOTOPES.
Annual progress rept. 15 Jul 62-30 Jun 63.
W. Spindel. [1963] 47p
Contract AT(30-1)2250
OTS $4.60

DESCRIPTORS: *Oxygen, *Isotopes, *Exchange reactions, *Nitrogen, *Oxides, *Isotope separation,

Nuclear Engineering and Power

IDO-28617
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM.
Quarterly progress rept., 1 Jul-30 Sep 63. 15 Nov 63, 61p
Contract AT(10-1)880
OTS $1.50

AGN-TM-405
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM: ML-1 PRESSURE VESSEL REPAIR. Summary rept.
Dec 63, 67p
Contract AT(10-1)880
OTS $1.50

ACNP-63809(Vol. I)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
INLAND ANTARCTIC STATION NUCLEAR POWER PLANT SUMMARY DESIGN REPORT. VOLUME I. DESIGN DATA. Jul 63, 180p
Contract AT(30-1)3111
NYO-10516, vol. 1
OTS $12.50

DESCRIPTORS: *Nuclear power plants.

ACNP-63809(Vol. II)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
INLAND ANTARCTIC STATION NUCLEAR POWER PLANT SUMMARY DESIGN REPORT. VOLUME II. PRELIMINARY SAFETY ANALYSIS.
F. T. Matthews, comp. Jul 63, 310p
Contract AT(30-1)3111
NYO-10516, Vol. II
OTS $19.75

DESCRIPTORS: *Nuclear power plants, *Reactor safety systems.

ACNP-63020
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
INVESTIGATION OF VAPOR VOLUME FRACTION AND SLIP VELOCITY UNDER THE EURATOM PROGRAM. Quarterly progress rept. for 15 Apr-30 Jun 63. 10 Jul 63, 25p
Contract AT(11-1)1272
EURAEC-742
OTS $2.60

DESCRIPTORS: *Boilers, *Fluid flow, *Vapors.

ACNP-63029
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
INVESTIGATION OF VAPOR VOLUME FRACTION AND SLIP VELOCITY UNDER THE EURATOM PROGRAM. Quarterly progress rept. for 1 Jul-30 Sep 63
Winfred A. Bezella, Mark Healy, Glenn J. Kangas, and Kenneth F. Neusen. 10 Oct 63 25p
Contract AT(11-1)1272
EURAEC-842
OTS $2.60

DESCRIPTORS: *Boiling, *Bubbles.

ACNP-6112(Rev. 1)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. PROGRAM AND ORGANIZATION FOR PREOPERATIONAL AND NUCLEAR TESTING. 15 May 63, 70p Prepared in cooperation with Northern States Power Co.
OTS $6.60

DESCRIPTORS: *Power reactors.

ACNP-63017
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. DESIGN AND OPERATION OF A BOILING AND SUPERHEATING HEAT TRANSFER LOOP.
R. B. Jerman and Mark Healy. 15 Aug 63, 23p
Contract AT(11-1)589
OTS $2.60

DESCRIPTORS: *Heat transfer.

ACNP-63023
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. END CLOSURE DEVELOPMENT FOR LOW ENRICHMENT SUPERHEATER FUEL RODS.
R. A. Boschke and R. J. Wiggins. 30 Jul 63, 43p
Contract AT(11-1)589
OTS $4.60

DESCRIPTORS: *Reactor fuel elements, Welding.

ACNP-62031
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. REACTOR INTERNAL COMPONENTS.
D. R. Bruesewitz, J. F. Wilson, E. C. Rothen, D. J. Nolan, and J. F. Patterson. 28 Jun 63, 179p
Contract AT(11-1)589
OTS $12.50

DESCRIPTORS: *Power reactors

ACNP-62030
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT: SUPERHEATED STEAM HEAT TRANSFER AND PRESSURE DROP EXPERIMENTS
K. F. Neusen, G. J. Kangas, and N. C. Sher. 15 May 63, 37p
Contract AT(11-1)589
OTS $3.60

DESCRIPTORS: *Heat transfer.

ACNP-63518 (Rev. 1)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
REPORT ON OPERATION OF THE ELK RIVER REACTOR. Topical rept. no. 1, on Initial Startup and Testing at Atmospheric Pressure, 1 Nov 62-20 Jan 63. 24 Jun 63, rev. 21 Aug 63, 44p
Contract AT(11-1)589
OTS $4.60

DESCRIPTORS: *Power reactors.

ACNP-63012
Allis Chalmers Mfg. Co., Milwaukee, Wis.
SHAPED BURNABLE POISON DEVELOPMENT PROGRAM. Quarterly progress rept. for 1 Dec 62-28 Feb 63 10 Apr 63, 35p
Contract AT(11-1)1229
EURAEC-628
OTS $3.60

DESCRIPTORS: *Gadolinium,*Isotopes, *Neutron cross sections.

ACNP-63022
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
SHAPED BURNABLE POISON DEVELOPMENT PROGRAM UNDER THE EURATOM PROGRAM. Quarterly progress rept. for 1 Mar-30 Jun 63, 10 Jul 63, 57p
Contract AT(11-1)1229
EURAEC-759
OTS $5.60

DESCRIPTORS: *Boiling water reactors, *Reactor poisons.

ACNP-63028
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
STEAM SEPARATION TECHNOLOGY UNDER THE EURATOM PROGRAM. Quarterly progress rept. for 1 Jul-30 Sep 63 10 Oct 63, 113p
Contract AT(11-1)1186
EURAEC-828
OTS $9.60

DESCRIPTORS: *Air, *Steam, *Water, *Separation, *Cyclones (Mechanical), *Liquid level gages.

ACNP-63021
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
STEAM SEPARATION TECHNOLOGY UNDER THE EURATOM PROGRAM. Quarterly progress rept for 1 Apr-30 Jun 63 10 Jul 63, 137p
Contract AT(11-1)1186
EURAEC-743
OTS $10.50

DESCRIPTORS: *Air, *Steam, *Water, *Separation, *Cyclones (Mechanical).

ACNP-62848 & Add. 1
Allis-Chalmers Mfg. Co., Schenectady, N. Y.
BYRD STATION STUDY. Final rept. 15 Oct-15 Dec 62 [1963] 382p
Contract AT(30-1)3111
NYO-10493
OTS $21.00

DESCRIPTORS: *Power reactors.

ACNP-62573
Allis-Chalmers Mfg. Co., Washington, D. C.
COOLANT SYSTEM PIPING FAILURES HAZARDS ANALYSIS. EXPERIMENTAL GAS COOLED REACTOR
R. L. Schlegel and A. DeAgazio. 21 Mar 63, 55p
Contract AT(11-1)654
EGCR-STUDY-IV-303(rev. 1)
OTS $5.60

DESCRIPTORS: *Gas cooled reactors, *Reactor safety systems.

TID-11599
Allis-Chalmers Mfg. Co., Washington, D. C.
CORE SEAL EXPERIMENT [FOR] EGCR RESEARCH AND DEVELOPMENT SECTION
P. J. Lain. 1 Aug 60, rev. 2 Jun 61, 46p
Contract AT(10-1)925
Rept. no. RD-0201
OTS $4.60

DESCRIPTORS: *Gas cooled reactor.

TID-11597
Allis-Chalmers Mfg. Co., Washington, D. C.
HEAT TRANSFER EXPERIMENTS OF THE TITLE II FUEL ASSEMBLY FOR THE EXPERIMENTAL GAS COOLED REACTOR. SECTION IV OF THE FUEL ASSEMBLY HEAT TRANSFER AND CHANNEL PRESSURE DROP EXPERIMENT OF THE EGCR RESEARCH AND DEVELOPMENT PROGRAM
Thomas J. McDonald and R. M. Higgins. 3 Oct 60, 95p
Contract AT(10-1)925
Rept. no. RD-0010
OTS $8.60

DESCRIPTORS: *Gas cooled. reactors.

ACNP-63529
Allis-Chalmers Mfg. Co., Washington, D. C.
STEAM SYSTEM AND FEEDWATER SYSTEM FAILURES
S. Matovich, comp. 20 Dec 61, 173p
Contract AT(10-1)925
EGCR-STUDY-IV-334
OTS $12.50

DESCRIPTORS: *Gas cooled reactors,*Hazards

NP-12980
American Society of Civil Engineers, New York.
REACTOR CONTAINMENT
Richard J. Smith, ed. Nov 63, 25p
OTS $0.50

NAA-SR-MEMO-8427
Atomics International, Canoga Park, Calif.
ANALYTICAL TECHNIQUES FOR THE CALCULATION OF THE ORNL TOWER SHIELD EXPERIMENTS, PART I, ANNEX-1
R. S. Hubner. 23 Apr 63, 144p
Contract AT(11-1)GEN-8
OTS $11.00

DESCRIPTORS: *Neutron beams, *Scattering.

NAA-SR-Memo-8456
Atomics International, Canoga Park, Calif.
ENERGY RELEASE IN AN HNPF UC FUEL SLUG IN TREAT, AND NUCLEAR EFFECTS OF THE TEST ON THE TREAT CORE
J. M. Otter. 30 Apr 63, 11p
Contract AT(11-1)GEN-8
OTS $1.60

DESCRIPTORS: *Uranium, *Carbides,

TID-18975
Atomics International, Canoga Park, Calif.
HALLAM NUCLEAR POWER FACILITY: FUEL CYCLES
M. P. Aronchick. 15 Aug 58, rev. 31 Oct 62. 29p
Contract AT(04-3)187
OTS $2.60

DESCRIPTORS: *Power reactors.

NAA-SR-MEMO-8406
Atomics International, Canoga Park, Calif.
HYDRAULIC STUDIES OF A PROPOSED 9-ROD SRE 3RD CORE FUEL ELEMENT
J. H. Brindley. 23 Apr 63, 21p
Contract AT(11-1)GEN-8
OTS $2.60

NAA-SR-MEMO-6688
Atomics International, Canoga Park, Calif.
IDENTIFICATION OF REAL AND SPURIOUS SCRAMS INITIATED BY THE SRE LOG N-PERIOD CIRCUIT
E. L. Gardner and R. A. Lewis. 1 Apr 63, 18p
Contract AT(11-1)GEN-8
OTS $1.60

NAA-SR-Memo-6117
Atomics International, Canoga Park, Calif.
LIQUID METAL FLOWMETER OF THE E-CORE FLUX DISTORTION TYPE
C. G. Bergdorf. 8 Feb 61, 12p
Contract AT(11-1)GEN-8
OTS $1.60

NAA-SR-MEMO-8407
Atomics International, Canoga Park, Calif.
PREIRRADIATION MEASUREMENTS OF PIQUA FUEL ELEMENTS P-1097, P-1098, P-1099, P-1100, AND P-1117
B. F. DaSilva and H. J. Hubbell. 31 May 63, 89p
Contract AT(11-1)GEN-8
OTS $8.10

DESCRIPTORS: *Power reactors.

NAA-SR-Memo-8529
Atomics International, Canoga Park, Calif.
THERMAL ANALYSIS OF THE SGR MARK IV CONTROL ROD ABSORBER ASSEMBLY
C. G. Johnson and G. C. Burry. 1 May 63, 57p
Contract AT(11-1)GEN-8
OTS $5.60

BAW-1249(Vol. II)
Babock and Wilcox Co., Lynchburg, Va.
NS SAVANNAH REPLACEMENT CONTROL ROD DRIVES SAFEGUARDS REPORT. VOLUME II. DESCRIPTION OF SYSTEM MODIFICATIONS AND HAZARDS ANALYSIS
Robert E. Wascher, comp. Oct 62, 106p
Contract AT(30-1)2721
OTS $9.10

DESCRIPTORS: *Pressurized water reactors, *Merchant vessels.

BMI-X-238
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS ON USAEC/AECL COOPERATIVE PROGRAM. Quarterly rept. for Mar-May 63.
Stanley W. Porembka. 10 Jun 63, 18p
Contract W7405-eng-92
OTS $1.60

DESCRIPTORS: *Creep.

WAPD-T-1371(Rev.)
Bettis Atomic Power Lab., Pittsburgh, Pa.
BORON CAPTURE FRACTION MEASUREMENTS IN PWR-2 GEOMETRY
W. Baer. Jun 62, 15p
Contract AT(11-1)GEN-14
OTS $1.60

DESCRIPTORS: *Pressurized water reactor; *Neutrons, *Boron, *Neutron capture,

WAPD-T-1369 (Rev.)
Bettis Atomic Power Lab., Pittsburgh, Pa.
MEASUREMENT AND CALCULATION OF THE POWER DISTRIBUTION IN THE PWR-2 MOCK-UP
W. Baer, R. P. Christman, R. F. Valentine, and K. P. Barr. Jun 62, 17p
Contract AT(11-1)GEN-14
OTS $1.60

DESCRIPTORS: *Pressurized water reactors

WAPD-T-1501
Bettis Atomic Power Lab., Pittsburgh, Pa.
MICROSTRUCTURAL CHANGES ASSOCIATED WITH IRRADIATION BURNUP OF URANIUM DIOXIDE
Thomas R. Padden and Paul S. Schnizler. Aug 62, 31p
Contract AT(11-1)GEN-14
OTS $3.60

DESCRIPTORS: *Oxides, *Radiation effects, *Uranium compounds

WAPD-T-1563
Bettis Atomic Power Lab., Pittsburgh, Pa.
P-3 MULTIGROUP CALCULATIONS OF NEUTRON ATTENUATION
K. Shure. May 63, 21p
Contract AT(11-1)GEN-14
OTS $2.60

DESCRIPTORS: *Shielding, *Water, *Iron, *Neutrons.

WAPD-T-1530
Bettis Atomic Power Lab., Pittsburgh, Pa.
PRODUCTION CONFIDENCE IN NDT METHODS
Don M. McCutcheon. [30 Apr 63], 30p
Contract AT(11-1)GEN-14
OTS $2.60

DESCRIPTORS: *Non-destructive testing, *Pressurized water reactors.

WAPD-T-1376
Bettis Atomic Power Lab., Pittsburgh, Pa.
A REVIEW OF METHODS FOR DESCRIBING THE DETAILED TIME BEHAVIOR OF REACTORS
A. F. Henry. Sep 61, 18p
Contract AT(11-1)GEN-14
OTS $1.60

DESCRIPTORS: *Reactors, *Reactor reactivity.

EURAEC-289
Centro Informazioni Studi Esperienze, Milan (Italy).
DEVELOPMENT PROGRAM ON THE APPLICATION OF STEAM-WATER SPRAY TO REACTOR COOLING. CAN 3. Progress rept. no. 1, 15 Dec 61-31 Mar 62.
5 Apr 62, 22p
Contract 056-62-1-RDI
R-54
OTS $2.60

DESCRIPTORS: *Heat transfer, *Reactor coolants,

EURAEC-368
Compagnie Industrielle des Combustibles Atomiques Frittes, Corbeville (France).
URANIUM OXIDE EXTRUSION. Final rept.
R. Hauser. Mar 63, 32p
Contract 030-60-9 RDF
EUR-89.f
OTS $3.60

DESCRIPTORS: *Uranium, *Oxides, *Reactor fuel rods.

DLCS-5000563
Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT, MAY 1963, 43p
Contract AT(11-1)292
OTS $4.60

DESCRIPTORS: *Operation, Pressurized water reactors.

DLCS-3360304
Duquesne Light Co., Shippingport, Pa.
PERIODIC CALIBRATION OF PRESSURE INSTRUMENTATION, CORE I, SEED 3. 26 Apr 63, 9p
Contract AT(11-1)292
OTS $1.10

DESCRIPTORS: *Pressure gages.

NYO-10574
Dynatech Corp., Cambridge, Mass.
EVALUATION OF AUTOMATIC FLOW BALANCING DEVICE IN BOILING WATER REACTORS. Quarterly progress rept. for Apr-Jun 63.
R. L. Mela, D. A. Gall, and E. F. Doyle. 10 Jul 63, 20p
Contract AT(30-1)2907
Rept. no. 412
OTS $1.60

DESCRIPTORS: *Boiling water reactors, *Reactor coolants, *Heat transfer.

GA-4130
General Atomic Div., General Dynamics Corp., San Diego, Calif.
TEMPERATURE COEFFICIENT CALCULATIONS FOR THE EXPERIMENTAL BERYLLIUM OXIDE REACTOR
A. J. Goodjohn and A. D. McWhirter. 1 May 63, 16p
Contract AT(04-3)187
OTS $1.60

DESCRIPTORS: *Gas-cooled reactors,

GEAP-3771-5
General Electric Co., San Jose, Calif.
HIGH PERFORMANCE UO_2 PROGRAM. Quarterly progress rept. no. 5, Apr-Jun 62.
B. Weidenbaum. Jun 62, 78p
Contract AT(04-3)189
EURAEC-489
OTS $7.60

DESCRIPTORS: *Reactor fuel elements, *Fission products.

GEAP-4228
General Electric Co., San Jose, Calif.
TRANSITION BOILING HEAT TRANSFER PROGRAM. Quarterly progress rept. no. 1, Feb-Mar 63.
Frank E. Tippets, 15 Apr 63, 11p
Contract AT(04-3)189
EURAEC-640
OTS $1.60

DESCRIPTORS: *Boiling, *Heat transfer,

GNEC-174
General Nuclear Engineering Corp., Dunedin, Fla.
FABRICATION PROCESS DEVELOPMENT ON BONUS-TYPE COLLAPSED-CLAD FUEL ELEMENTS. Interim rept. 17 May 61, 42p. Prepared in cooperation with Combustion Engineering, Inc.
Contract AT(11-1)795
OTS $4.60

DESCRIPTORS: *Reactor fuel elements.

HW-77767
Hanford Atomic Products Operation, Richland, Wash.
BRIEF SUMMARY OF CALCULATIONS ON CRITICAL MEASUREMENTS OF CYLINDERS IN CUBIC ARRAYS WITH OR WITHOUT REFLECTOR
F. R. Czerniejewski. 29 May 63, 7p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Nitrates, *Uranyl radicals.

HW-SA-3012
Hanford Atomic Products Operation, Richland, Wash.
THE EFFECTS OF COLD WORK AND NEUTRON IRRADIATION ON THE TNESILE PROPERTIES OF ZIRCALOY-2
A. L. Bement and J. E. Irvin. 18 Apr 63, 29p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Radiation effects, *Zirconium alloys,

HW-SA-2650
Hanford Atomic Products Operation, Richland, Wash.
EVOLUTION OF URANIUM DIOXIDE STRUCTURE DURING IRRADIATION OF FUEL RODS
D. R. de Halas and G. R. Horn. 25 Jun 62, 36p
Contract AT(45-1)1350
OTS $3.60

DESCRIPTORS: *Uranium compounds, *Oxides, *Reactor fuel rods, *Radiation effects

HW-SA-3036
Hanford Atomic Products Operation, Richland, Wash.
MONITORING SURFACE TEMPERATURE OF IRRADIATED FUEL ELEMENTS
R. G. Clark. 6 May 63, 79p
Contract AT(45-1)1350
OTS $7.60

DESCRIPTORS: *Reactor fuel elements, *Thermometers.

HW-SA-3045
Hanford Atomic Products Operation, Richland, Wash.
NUCLEAR REACTOR FUEL QUALITY
W. R. Krehbiel. 24 May 63, 18p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: *Reactor fuel elements, *Quality control

HW-SA-3032
Hanford Atomic Products Operation, Richland, Wash.
RADIATION SHIELDING PROGRAM AT HANFORD
W. L. Bunch. 27 Apr 63, 22p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Shielding, *Gamma rays,

HW-61379
Hanford Atomic Products Operation, Richland, Wash.
RUPTURE KINETICS OF ZIRCALOY CLAD FUEL ELEMENTS IN HIGH TEMPERATURE WATER AND STEAM. CO-EXTRUDED ROD ELEMENTS WITH PINHOL DEFECTS. Interim rept. no. 2
V. H. Troutner. 3 Aug 59, 5p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Reactor fuel rods, *Rupture, *Uranium,

HW-79127
Hanford Atomic Products Operation, Richland, Wash.
TESTING REACTOR INSTRUMENTATION WITH EXPONENTIAL SIGNALS
B. E. Dozer. Oct 63, 16p
Contract AT(45-1)1350
OTS $0.50

HW-77638
Hanford Atomic Products Operation, Richland, Wash.
TRANSIENT FISSION PRODUCT POISONING IN PRTR
R. I. Smith. 20 May 63, 26p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Fission products.

HW-SA-3040
Hanford Atomic Products Operation, Richland, Wash.
USE OF AUTORADIOGRAPHY IN MICROSAMPLING OF IRRADIATED CERAMIC FUEL ELEMENTS
R. Teats. 10 May 63, 4p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Reactor fuel elements.

KR-43
Institutt for Atomenergi, Kjeller (Norway).
INVESTIGATIONS IN SPATIAL REACTOR KINETICS
P. T. Hansson and L. R. Foulke. Apr 63, 45p
OTS $4.60

DESCRIPTORS: *Research reactors, *Reactors,

NYO-9990
Jackson and Moreland, Inc., Boston, Mass.
EURATOM REACTOR FUEL MANAGEMENT PROGRAM: PART I. SYNTHESIS OF RESULTS. Final rept. Jan 63, 142p
Contract AT(30-1)2875
EURAEC-803 (Pt. I)
OTS $2.50

NYO-9991
Jackson and Moreland, Inc., Boston, Mass.
EURATOM REACTOR FUEL MANAGEMENT PROGRAM. PART II. PHYSICS ANALYSIS. Final rept. Jan 63, 220p
Contract AT(30-1)2875
OTS $3.00

LAMS-3036
Los Alamos Scientific Lab., N. Mex.
ULTRA HIGH TEMPERATURE REACTOR EXPERIMENT (UHTREX). Quarterly status rept. for period ending 20 Dec 63. Jan 64, 23p
Contract W7405-eng-36
OTS $0.50

MND-MD-2560-8
Martin-Marietta Corp., Baltimore, Md.
PM RESEARCH AND DEVELOPMENT PROGRAM. Quarterly progress rept. no. 8, 1 Jan-31 Mar 63. [1963] 113p
Contract AT(30-1)2706
OTS $9.60

NMI-7246
Nuclear Metals Inc., Concord, Mass.
POWER REACTOR PROGRAM. Progress rept. for 1-31 Dec 61.
S. Isserow, R. W. Anderson, W. L. Larson, and A. R. Gilman. 7 Feb 62, 16p
Contract AT(30-1)2784
OTS $1.60

DESCRIPTORS: *Power reactors.

ORNL-TM-590
Oak Ridge National Lab., Tenn.
AN ECONOMIC ANALYSIS OF THE DOMESTIC AND OVERSEAS SHIPMENT OF SPENT REACTOR FUEL
L. B. Shappert. 27 Jun 63, 21p
Contract W7405-eng-26
OTS $2.60

DESCRIPTORS: *Reactor fuels, *Transportation, *Costs

ORNL-TM-588
Oak Ridge National Lab., Tenn.
A NEW PROCESS FOR THE REMOTE PREPARATION AND FABRICATION OF FUEL ELEMENTS CONTAINING URANIUM-233 OXIDE-THORIUM OXIDE
O. C. Dean, R. E. Brooksbank, and A. L. Lotts. 10 Jun 63, 40p
Contract W7405-eng-26
OTS $3.60

DESCRIPTORS: *Reactor fuel elements.

NP-13092
Old Dominion Coll., Norfolk, Va.
SUBCRITICAL ASSEMBLIES. A compilation of references.
W. Maurice Pritchard. Aug 63, 40p
OTS $1.00

PWAC-385
Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
LCRE SECONDARY COLLANT PUMP AND SUMP. Design summary rept.
C. Ferguson, L. K. Knudsen, R. P. Lamers, B. R. Lucas, and H. P. Odom. 10 Jan 64, 34p
Contract AT(30-1)2789
OTS $0.75

PRWRA-GNEC-7
Puerto Rico Water Resources Authority, San Juan.
BOILING NUCLEAR SUPERHEATER (BONUS) POWER STATION: RADIATION PROTECTION STANDARDS. 1 Dec 61, 60p Prepared in cooperation with General Nuclear Engineering Corp.
Contract AT(40-1)2674
OTS $5.60

DESCRIPTORS: *Handbooks, *Radiation monitors.

TID-18955
Rutgers Univ., New Brunswick, N. J. School of Chemistry
STUDIES IN NUCLEAR AND RADIOCHEMISTRY. Rept. for 1 May 62-30 Apr 63.
Rolfe H. Herber. [1963] 46p
Contract AT(30-1)2472
OTS $4.60

DESCRIPTORS: *Mossbauer effect, *Radiochemistry.

SCTM-284-62(53)
Sandia Corp., Albuquerque, N. Mex.
POWER CALIBRATION OF THE SANDIA PULSED REACTOR
J. A. Snyder and W. E. Taylor. Jan 63, 17p
Contract AT(29-1)789
OTS $1.60

DESCRIPTORS: *Instrumentation,

TID-18967
Savannah River Lab., Aiken, S. C.
COMPARISON OF THE WORTH OF CRITICAL AND EXPONENTIAL MEASUREMENTS FOR HEAVY WATER MODERATED REACTORS
W. E. Graves and E. J. Hennelly. Jul 63, 50p
Contract AT(07-2)1
OTS $4.60

DESCRIPTORS: *Heavy water reactors,

SRO-83
Savannah River Operations Office, Augusta, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. for May 63. [1963] 12p
OTS $1.60

DESCRIPTORS: *Heavy water reactors.

EURAEC-164
Stanray Corp., Chicago, Ill.
DESIGN AND ECONOMY STUDY OF SPENT FUEL SHIPPING. Quarterly rept. no. 1, 1 May-30 Jun 61.
Gerald Fisher. 28 Jun 60, 8p
Contract AT(11-1)963
OTS $1.10

NYO-10280
Stoller (S. M.) Associates, New York.
THE EFFECT OF AEC SITE SELECTION PRACTICE ON POWER TRANSMISSION COSTS AND THE POTENTIAL NUCLEAR MARKET
L. Geller, J. F. Hogerton, F. J. Leerburger, and S. M. Stoller. 26 Mar 63, 55p
Contract AT(30-1)2987
OTS $5.60

DESCRIPTORS: *Nuclear power plants, *Electric power production, *Economics

NYO-10486
Thayer School of Engineering, Dartmouth Coll., Hanover, N. H.
TWO-PHASE FLOW AND BOILING HEAT TRANSFER. Quarterly progress rept.
G. B. Wallis, D. A. Steen, C. B. Edgar, Jr., and S. N. Brenner. Apr 63, 44p
Contract AT(30-1)3114
EURAEC-674
OTS $4.60

DESCRIPTORS: *Fluid flow, *Bubbles,

UNC-5055
United Nuclear Corp., White Plains, N. Y.
CARBIDE FUEL DEVELOPMENT. Phase 4 rept. for 15 Sep 61-30 Sep 62.
A. Strasser, K. Taylor, and J. Anderson. 31 Mar 63, 61p Prepared in cooperation with Carborundum Co.
Contract AT(30-1)2899
OTS $6.60

DESCRIPTORS: *Carbides, *Reactor fuels.

UNC-5056
United Nuclear Corp., White Plains, N. Y.
CARBIDE FUEL DEVELOPMENT. Progress rept. for 1 Oct 62-31 Mar 63
A. Strasser, D. Stahl, K. Taylor, and J. Anderson. 1 May 63, 47p Prepared in cooperation with Carborundum Co., Niagara Falls, N. Y.
Contract AT(30-1)2899
OTS $4.60

DESCRIPTORS: *Carbides, *Reactor fuels.

GEAP-3933
Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
SUPERHEAT STRAIN-CYCLE CAPSULE. Design rept.
I. L. Marburger, E. A. Haglund, D. E. Hafer, D. I. Liffengren, and S. F. Armour. Jan 63, 48p
Contract AT(04-3)189
OTS $4.60

DESCRIPTORS: *Heat transfer, *Reactor fuel elements.

WCAP-4187
Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT. CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. for May 1963, 7p
Contract AT(30-1)2289
OTS $1.10

DESCRIPTORS: *Power reactors.

Nuclear Structure

BNL-6205
Brookhaven National Lab., Upton, N. Y.
SECOND ORDER EFFECTS OF NUCLEAR MAGNETIC FIELDS
Morton M. Sternheim. 14 Jun 62, 8p
Contract AT(30-2)GEN-16
OTS $1.10

DESCRIPTORS: *Nuclear structure,

UCOL-P-518
Colorado Univ., Boulder
THE LEVEL STRUCTURE OF Sc^{44}
J. K. Kliwer, J. J. Kraushaar, R. A. Ristinen, J. R. Keith, and A. A. Bartlett. [1962] 37p
Contract AT(11-1)535
OTS $3.60

DESCRIPTORS: *Scandium, *Isotopes, *Titanium, *Nuclear structure.

Waste Disposal

HW-74043
Hanford Atomic Products Operation, Richland, Wash.
BATCH CALCINATION STUDIES. Interim rept.
J. J. Shefcik. 19 Jun 62, 21p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Radioactive waste,

HW-SA-3056
Hanford Atomic Products Operation, Richland, Wash.
DETERMINATION OF RIVER DISPERSION FACTORS
G. E. Backman. 24 May 63, 20p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: *Radioactive waste.

IDO-14624
Phillips Petroleum Co., Idaho Falls.
REMOVAL OF RADIOISOTOPES FROM SOLUTION BY EARTH MATERIALS FROM EASTERN IDAHO
M. W. Wilding and D. W. Rhodes. 8 Nov 63, 64p
Contract AT(10-1)205
OTS $1.50

EURAEC-295
Société Belge de Chimie Nucléaire, Brussels (Belgium).
RESEARCH PROGRAM ON THE TREATMENT AND STORAGE OF RADIOACTIVE WASTES
L. Baestle, P. Dejonghe, R. Lopes Cardozo, W. Maes, and E. S. Simpson. 1962, 78p Prepared in cooperation with Centre d'Etude de l'Energie Nucleaire.
Contract 010-60-4-RDB
EUR-81.e
OTS $7.60

DESCRIPTORS: *Radioactive waste, *Disposal

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

AD-422 668
[Army Natick Labs.] Mass.
TECHNIQUES FOR SALVAGE ANALYSIS OF CLOTHING, FOOTWEAR AND TEXTILE EQUIPAGE
S. J. Kennedy, Edward B. Frederick, Jesse E. Johnston, Jr., and Louis I. Weiner. Jul 63, 112p
Textile series rept. no. 126
OTS $2.50

DESCRIPTORS: *Clothing, *Shoes, Textiles, *Armed forces supplies, Acceptability,

Summarized are techniques developed by Army technologists for making salvage studies of textile items, equipage and footwear. Reasons for discard of clothing are discussed, together with clothing wear characteristics. Salvage items are requisitioned from basic training stations, overseas commands or areas of active combat. An original group of 500 items are required for a salvage study and they must be properly segregated, sorted and marked before forwarding. At the examining center Army technologists make a further random selection using a sample minimum of from 25 to 50 for the study. They systematically examine each item, identify and classify the failure, then record on the check list the location and specify ranking (minor, major, critical). Any one of the three methods of analyzing the results may be used, but it is recommended that more than one method be used. Included in the appendixes is part of a sample report of salvage analysis and a report on the analysis of 5,000 boots worn in Korea. (Author)

PHYSICS

UCRL-6981-T(Rev. 1)
Lawrence Radiation Lab., Univ. of California, Livermore.
A NOTE ON THE MAXIMUM BOUND PRINCIPAL QUANTUM NUMBER
Carl A. Rouse. Jul 62, rev. Jun 63, 10p
Contract W7405-eng-48
OTS $1.10

DESCRIPTORS: *Ions, *Plasma physics, *Quantum statistics.

AD-295 607
National Bureau of Standards, Washington, D. C.
REFERENCE TABLES FOR THE PALLADIUM VS PLATINUM-15% IRIDIUM THERMOCOUPLE. Final rept.
Paul D. Freeze, Frank L. Caldwell, and Edwin R. Davis. Dec 62, 85p
Contract AF33(616)61-01
ASD-TDR-62-525
OTS $8.10

DESCRIPTORS: *Thermocouples, *Platinum, *Iridium alloys, *Platinum alloys, Calibration, Tables.

The purpose of the development of the palladium vs platinum-15% iridium (PPI) thermocouple was for measurement of temperatures up to 2300°F, and to obtain a high thermal sensitivity in this range. Comprehensive calibration tables were prepared giving the thermal emf of the palladium versus platinum-15% iridium thermocouple system in the temperature range from -80° to 2550°F. These expanded tables are given in both degrees Celsius and Fahrenheit at intervals of one degree as the argument. Conversely, similar tables using electromotive force at intervals of 10 microvolts as the argument are presented. It is believed that these expanded calibration tables give thermal emf values better than 0.1% for the six thermocouples examined. Some other information includes a table of the observed temperature-emf relationship of the PPI negative element palladium vs platinum Pt 27, and of the positive element platinum-15% iridium vs platinum Pt 27. The method used in calibrating the thermocouples in the range 32° to 2550°F is described briefly. (Author)

AD-419 842
Naval Ordnance Lab., White Oak, Md.
ELASTIC WAVE DECAY
Paul Harris. 22 Jul 63, 16p
NOLTR-63-158; N63-22493
OTS $0.50

DESCRIPTORS: *Shock waves, Propagation, *Mechanical waves, Elasticity, Attenuation, Models (Simulations)

A microscopic viscosity approach is applied to the problem of attenuating elastic waves in solids having straight dislocations lying in energy wells biased by the applied shear stress. This model is found to be lacking. From analogy with ultrasonic attenuation, a more appropriate model based upon the loss mechanism applicable to the so-called "Fatigue" range of ultrasonics is proposed. The question of the shock front thickness associated with the decaying elastic wave is also touched upon. (Author)

AD-420 421
Naval Research Lab., Washington, D. C.
DIRECT ENERGY CONVERSION LITERATURE ABSTRACTS. Rept. no. 5
Eileen Pickenpaugh, comp. Jul 63, 182p
N63-22751; N63-23603
OTS $3.00

DESCRIPTORS: *Abstracts, Bibliographies, *Energy conversion, *Thermoelectricity, *Thermionic emission, *Photoelectric effect, Semiconductor devices, *Magnetohydrodynamics, Plasma physics, *Electrochemistry, *Batteries and components, *Fuel cells, *Power reactors, *Solar cells.

A collection of annotated references from various sources covering the current literature on the thermoelectricity, thermionic emission, photoelectric processes, magnetohydrodynamics, electrochemical processes, energy storage, and energy sources. (See also PB 161 714)

AD-424 845
RCA Victor Co., Ltd., Montreal (Canada).
GENERATION OF NEGATIVE IONS IN A GAS DISCHARGE. Rept. for Feb 62-Apr 63
G. G. Cloutier and C. Richard. Nov 63, 153p
Contract AF33(657)7906
Research rept. no. 7-811-6; ASD-TDR-63-858
OTS $3.00

DESCRIPTORS: *Ion beams, Production, Ion sources, *Gas discharges, Glow discharges, Argon, *Sulfur compounds, *Fluorides, *Iodine, *Ionic current, Measurement, Mass spectroscopy, *Plasma physics,

The results of a research program on the generation of heavy negative ions in a gas discharge are reported. The design and operation of the gas discharge ion source are described in detail. The negative ions were generated by producing a discharge through a mixture of an electronegative gas and argon. Three basic types of measurements were carried out using two different electronegative gases: SF_6 and iodine. The total negative ion current extracted from the ion source, the various negative ion species in the ion beam and the concentration of negative ions in the gas discharge were the three major objects of investigations. (Author)

Electricity and Magnetism

ARF-1184-9
IIT Research Inst., Chicago, Ill.
MAGNETIC PROPERTIES OF INSULATORS. Quarterly rept. no. 9, 16 Feb-15 May 63. 5 Jun 63, 49p
Contract AT(11-1)578
OTS $4.60

DESCRIPTORS: *Rubidium, *Potassium, *Chlorides, *Crystals.

AD-420 236
Indiana General Corp., Valparaiso
MANGANESE-ALUMINUM FOR PERMANENT MAGNET MATERIAL. Final rept.
M. A. Bohlmann. May 63, 34p
Contract AF33(657)8499
ASD-TDR-63-422
OTS $1.00

DESCRIPTORS: *Magnetic materials, *Magnesium alloys, *Aluminum alloys, Material forming, Deformation, Powder alloys, Magnetic properties, Crystal lattice defects.

Manganese-aluminum alloys with 68-73% Mn were developed for permanent magnet material. Best magnetic properties were obtained in 71% Mn alloys. Maximum energy product was 4.0×10^6 GOe, reached by homogenization, controlled quenching, reducing area 86% by swaging in jackets, and annealing. Process parameters were studied to find the optima for the brittle alloy. Deformation of the alloy produces a preferred magnetic axis and raises coercive force. Swaging was best, but deforming by turning cast bars into chips on a lathe gave the best "particle" magnets and was easiest. A review of the crystal and magnetic structures leads to the deduction that dislocation lines involve Mn atoms arranged antiferromagnetically which subdivide larger ferromagnetic regions. The magnetic saturation is not reached in practical magnetizing field. The magnetic induction decreases with increasing temperatures to Curie point. (Author)

AD-420 225
Indiana General Corp., Valparaiso
SUBMICRON PARTICLE MAGNETS OF IRON AND COBALT. Final rept.
H. M. Fulton. Apr 63, 47p
Contract AF33(657)8499
ASD-TDR-63-423
OTS $1.25

DESCRIPTORS: *Magnetic materials, *Powder metals, *Iron alloys, *Cobalt alloys, Mercury, Lead, Oxides, Material forming, Magnetic properties, Microstructure, Binders.

Submicron particles of iron, cobalt and iron-cobalt were made by electro-deposition into a mercury cathode. The gel of dendritic particles and mercury was pressed to form mercury matrix magnets. Heat treatments of the gel to optimize particle shape were studied together with the addition of small amounts of tin and similiar metals which formed protective coatings on the particles and sometimes improved the magnetic properties. The magnets were distilled to remove as much mercury as possible and the compacts were impregnated with resins or crushed, mixed with binders, and repressed. Lead matrix and oxide-coated particle magnets were also made and studied. Mercury matrix magnets were produced with energy products of 5.8×10^6 G Oe. Electron micrographs show that, in contrast to the fine structure of the submicron particles, a gross structure of the arranged particles may be important for determining the overall magnetic properties. (Author)

TID-18856
Sandia Corp., Albuquerque, N. Mex.
RADIATION EFFECTS ON LEAD ZIRCONATE TITANATE FERROELECTRICS
D. D. Glower and D. F. Warnke. Jun 63, 18p
Contract AT(29-1)189
SCDC-3126
OTS $1.60

DESCRIPTORS: *Lead, *Titanates, *Zirconates, *Radiation effects, *Ferroelectric materials.

Electronics

BNL-6952
Brookhaven National Lab., Upton, N. Y.
ANALOGUE MULTIPLICATION WITH FIELD-EFFECT TRANSISTORS
G. L. Miller and V. Radeka. [1963], 17p
Contract AT(30-2)GEN-16
OTS $1.60

DESCRIPTORS: *Transistors, *Amplifiers.

BNL-6953
Brookhaven National Lab., Upton, N. Y.
FIELD-EFFECTS TRANSISTORS IN CHARGE SENSITIVE AMPLIFIERS
V. Radeka. [1962] 17p
Contract AT(30-2)GEN-16
OTS $1.60

DESCRIPTORS: *Transistors, *Amplifiers.

UCRL-10801
Lawrence Radiation Lab., Univ. of California, Berkeley.
DIFFUSION FROM A LINE SOURCE IN A MAGNETIC FIELD
Klaus H. Berkner, Robert V. Pyle, Henry F. Rugge, J. Warren Stearns, and Joseph Winocur. 20 Jun 63, 16p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Plasma physics, *Diffusion, *Electrons, *Ions.

UCRL-10800
Lawrence Radiation Lab., Univ. of California, Berkeley.
ON THE HEATING OF ELECTRONS IN CROSSED ELECTRIC AND MAGNETIC FIELDS
Wulf B. Kunkel and Gary A. Pearson. 19 Jun 63, 15p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Electrons, *Plasma physics,

TID-18984
Stanford Linear Accelerator Center, Stanford Univ., Calif.
PHOTOELECTRIC EFFECT INDUCED BY HIGH-INTENSITY LASER LIGHT BEAM FROM QUARTZ AND BOROSILICATE GLASS
J. J. Muray. [1962] 17p
Contract AT(04-3)115
OTS $1.60

DESCRIPTORS: *Quartz, *Photoelectric effect, *Lasers,

SIT-P87
Stevens Inst. of Tech., Hoboken, N. J.
THE ROLE OF PLASMA VORTICES IN PLASMA TURBULENCE
Winston H. Bostick. Mar 63, 18p
Contracts AT(30-1)1921 and Contract AF19(604)4086; Grant AF AFOSR-62-225
OTS $1.60

DESCRIPTORS: *Plasma physics.

BNL-6139
Brookhaven National Lab., Upton, N. Y.
A BOND-CELL METHOD FOR COMPLEX MOLECULES AND METALS
C. M. Carlson. 19 Jun 62, 35p
Contract AT(30-2)GEN-16
OTS $3.60

DESCRIPTORS: *Metals, *Electron energy levels, *Molecules, *Quantum mechanics.

TID-18925
Knolls Atomic Power Lab., Schenectady, N. Y.
PRODUCTION OF X-RAY SPECTRA
Paul D. Zemany. [1962] 29p
Contract W31-109-eng-52
OTS $2.60

DESCRIPTORS: *X-ray spectrum.

Optics

PB-165 100
Naval Radiological Defense Lab., San Francisco, Calif.
TRANSMISSION AND SCATTERING PROPERTIES OF THE LOS ANGELES, CALIFORNIA ATMOSPHERE IN AUGUST AND SEPTEMBER 1960
E. R. Schleiger, J. R. Nichlos, and F. I. Laughridge. 10 Oct 61, 97p
USNRDL-TR-554
OTS $8.60

DESCRIPTORS: *Atmosphere, *Light transmission, Scattering, *Optical properties, Urban areas, *California, Night sky, Xenon lamps, Electromagnetic waves, Attenuation, Blackbody radiation, Optics, Measurement, Nuclear explosions

The amount of thermal radiation delivered to a given receiver from the fireball of a nuclear explosion depends on the transmittance of the atmosphere as a function of wavelength, the spectral distribution of the radiation, the receiver field of view, the range, the albedo of the terrain, and the amount and height above the ground of clouds present. The purpose of this experiment was to determine the range of transmittance values of the Los Angeles nighttime atmosphere during the months of August and September 1960. (Author)

PB-165 114
Warner and Swasey Co., Flushing, N. Y.
INFRARED RADIATION OF FLAMES. Final rept. on Proj. Defender
Richard H. Tourin, Harold J. Babrov, and Gunter J. Penzias. Oct 61, 77p
Contract AF19(604)6106
ARPA Order no. 6-58, Task 13; AFCRL-1071; N62-16304
OTS $7.60

DESCRIPTORS: Rocket motors, *Exhaust flames, *Flames, Temperature, *Infrared radiation, *Spectra (Infrared), Measurement, Laboratory equipment, Fuels, Hydrogen, Oxygen, Propellants, *Jet flames, Infrared tracking, Mathematical prediction,

Infrared spectral emittance and absorptance of flames were studied at various temperatures and for a variety of fuel-oxidizer combinations. Spectral emissivities were measured in the region 1 - 15-μ, as functions of fuel composition, flame temperature, and mixture ratio. Flame temperatures were determined from the infrared emission and absorption spectra, for various wavelengths. Methods of extrapolating flame radiance from laboratory to field conditions were investigated. For this purpose, the measurements of infrared flame spectra were correlated with concurrent analyses of molecular population distributions, transition probabilities, and spectral line shape and line width. A sample extrapolation was verified experimentally for a hydrogen-oxygen rocket engine, operating under simulated altitude conditions. Effects of altitude on the infrared radiation of flames were evaluated, with particular reference to the effects of reduced pressure on spectral line shape, and the applicability of theoretical infrared band models. (Author)

Solid State Physics

AD-425 614
[Aeronautical Systems Div.] Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERMAL DIFFUSIVITY OF SOLIDS UTILIZING OPTICAL LASER ILLUMINATION. Rept. for 1 Dec 62-1 Jul 63, on Materials Applications
Gary L. Denman. Oct 63, 27p
ASD-TDR-63-882; N64-14116
OTS $0.75

DESCRIPTORS: High temperature research, *Solids, *Thermal diffusion, Measurement, Lasers.

The application of the flash technique for measurement of thermal diffusivity of solid materials at high temperatures is discussed. The use of the technique, its limitations, and particularly the analytical difficulties encountered in considering high temperature radiation losses and specimen diathermancy are reviewed. The design of a high temperature thermal diffusivity apparatus is outlined utilizing a ruby laser pulse source, an indium-antimonide infrared detector system, and a high temperature tantalum furnace. (Author)

TID-17827
Argonne National Lab., Ill.
EXPERIMENTS WITH SUPERCONDUCTING WIRE AND SOLENOIDS
C. Laverick and H. K. Ihrig. 30 Oct 62, 13p
Contract W31-109-eng-38
OTS $1.60

DESCRIPTORS: *Semiconductors,

NAA-SR-Memo-504
Atomics International, Canoga Park, Calif.
ELECTRON IRRADIATION OF ORDERED Cu_3Au
J. A. Brinkman, C. J. Meechan, and C. E. Dixon. 11 Nov 52, 7p
Contract AT(11-1)GEN-8
OTS $1.10

BNL-7094
Brookhaven National Lab., Upton, N. Y.
DYNAMICS OF ATOMIC DISPLACEMENT PROCESSES. I. PRIMARY ENERGIES NEAR THRESHOLD.
Cavid Erginsoy. [1963] 39p
Contract AT(30-2)GEN-16
OTS $3.60

DESCRIPTORS: *Crystals, *Atoms.

UCRL-10714
Lawrence Radiation Lab., Univ. of California, Berkeley.
ORIGIN AND MULTIPLICATION OF DISLOCATIONS
G. Thomas. Mar 63, 39p
Contract W7405-eng-48
OTS $3.60

DESCRIPTORS: *Crystal structure, *Metals, *Solids.

A Review Presented at the AIME Western Metals Congress, March 1963, Los Angeles.

TID-18857
Sandia Corp., Albuquerque, N. Mex.
GAMMA-RAY PHOTOCONDUCTIVITY DECAY IN ORGANIC DIELECTRIC MATERIALS
S. E. Harrison. Jun 63, 19p
Contract AT(29-1)789
SCDC-3134
OTS $1.60

DESCRIPTORS: *Photoconductivity, *Dielectrics, *Radiation effects

TID-18843
Sandia Corp., Albuquerque, N. Mex.
NEUTRON EFFECTIVENESS IN PRODUCING PHOTOCONDUCTIVITY IN DIELECTRIC MATERIALS
F. N. Coppage and A. W. Snyder. Jun 63, 20p
Contract AT(29-1)789
SCDC-3125
OTS $1.60

DESCRIPTORS: *Dielectrics, *Radiation effects, *Photoconductivity,

Thermodynamics

HW-79621
Hanford Atomic Products Operation, Richland, Wash.
THE MEASUREMENT OF METAL TEMPERATURE BY AN ELECTROMAGNETIC INDUCTION METHOD
H. L. Libby. 12 Aug 63, 37p
Contract AT(45-1)1350
OTS $0.75

TID-18842
Illinois Univ., Urbana.
RESEARCH ON THE PROPERTIES OF MATERIALS AT LOW TEMPERATURES. Final rept. for 1 Jun 58-31 May 62
John C. Wheatley. May 63, 7p
Contract AT(11-1)1056
OTS $1.10

DESCRIPTORS: *Helium, *Isotopes,

UCRL-10805
Lawrence Radiation Lab., Univ. of California, Berkeley.
A PRACTICAL GUIDE TO THE OPTIMUM UTILIZATION OF COOLING CAPACITY OF BOIL-OFF GAS FROM CRYOGENIC APPARATUS
William Chamberlain and Harvey Maseck. 29 Apr 63, 34p
Contract W7405-eng-48
OTS $3.60

DESCRIPTORS: *Helium, *Evaporation, *Cryogenics.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB-165 101
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOLAR SIMULATION INSTRUMENTATION
Charles F. Norman. Jan 63, 42p
Contract AF40(600)1000
AEDC-TDR-62-191; N63-11775
OTS $4.60

DESCRIPTORS: *Solar atmosphere, *Solar radiation, *Space environmental conditions, Simulation, *Models (Simulations), Mercury lamps, Instrumentation, Control systems, Electromagnetic waves, Albedo,

The most important instrumentation and control devices required to operate, maintain, align, and measure the output of the Mark I solar simulator are described. The definition and simulation of the more significant sources of electromagnetic radiation in a space environment, i.e., insolation, albedo, and earth radiance, are discussed. (Author)

AD-425 535
Automation Industries, Inc., Boulder, Colo.
INVESTIGATION OF METHODS FOR DETERMINING ACTUAL FLAW SIZE IN MATERIALS BY NON-DESTRUCTIVE ULTRASONIC MEANS. Final rept., 15 Nov 61-18 Aug 62
Leo J. Anderson, Marvin R. Wick, and G. Posakony. Nov 63, 91p
Contract AF33(616)7279, continuation of AF33(616)5714
ASD-TR-61-205, Part II: N64-14319
OTS $2.25

DESCRIPTORS: *Non-destructive testing, *Ultrasonic radiation, *Test equipment, Electronic equipment, Display systems, Quality control, Design.

Work which was directed toward the development and evaluation of techniques for determining actual flaw size, orientation and geometry in materials by non-destructive ultrasonic means resulted in the development of a fully operational self-contained nondestructive testing instrument. This new instrument represents a new technology using sound beam properties in materials as operating parameters to produce an isometric presentation on a cathode ray tube. The end result is an operational instrument capable of rapid scan rates and a multi-purpose display system for setup, analysis by in-process viewing, and flaw area localization. (Author) (See also AD-268 894)

SOCIAL SCIENCES

AD-426 886 repriced
Center for Research in Management Science, Univ. of California, Berkeley
DECENTRALIZED PROCEDURES FOR PLANNING.
Technical rept. no. 15
E. Malinvaud. Nov 63, 72p
Contract Nonr-222(77)
OTS $2.00

DESCRIPTORS: *Management engineering, *Economics, Theory, *Scheduling, Industrial production, Vector analysis, Mathematical prediction.

One of the main aims of long-term plans is to facilitate the formation of a productive system which will be adapted to the needs of future growth. To attain this objective a solution to the multiple technical options which arise in different branches of avtivity must be solved. The plan should incorporate the best grouping of productive operations which can be implemented, given the country's resources and technological possibilities. (Author)

Documentation

PB-181 605
Committee on Scientific and Technical Information, Federal Council for Science and Technology, Washington, D. C.
STANDARDS FOR DESCRIPTIVE CATALOGING OF GOVERNMENT SCIENTIFIC AND TECHNICAL REPORTS. Dec 63, 37p
OTS $1.00

DESCRIPTORS: *Documentation, *Reports, *Standards, Instruction manuals,

The standard was written in an attempt to provide the simplest possible rules that can be used to produce practical uniformity of descriptive cataloging. Each element of descriptive cataloging information is defined; rules are given for the selection and presentation of each element; standards are given for the presentation of those elements requiring added entries; and a separate section on choice of corporate author heading is appended.

AD-289 546
Hughes Aircraft Co., Culver City, Calif.
ELECTRICAL AND ELECTRONIC PROPERTIES OF MATERIALS INFORMATION RETRIEVAL PROGRAM. Final rept. 5 Jul 61-15 Jun 62
H. Thayne Johnson, Emil Schafer, and Everett M. Wallace. Jun 62, 225p
Contract AF33(616)8438
Rept. no. P62-18; ASD-TDR-62-539
OTS $15.00

DESCRIPTORS: *Information retrieval, *Data processing systems, Electronic equipment, Electrical equipment, Materials, *Dielectrics, *Semiconductors,

See also AD-275 439

AD-420 969
Utica Coll. [of Syracuse Univ.] N. Y.
INDEXING AND ABSTRACTING EXPERIMENTATION SUPPORT. Final rept.
Owen Roberts. 31 Jan 63, 68p
Contract AF30(602)2586
RADC-TDR-63-61
OTS $1.75.

DESCRIPTORS: *Subject indexing, *Information retrieval, *Abstracts, Vocabulary, Counting methods, *Bibliographies,

Discussions are presented of the various tasks assigned to, and the problems encountered by, student investigators working in selected areas of Information Storage and Retrieval. The tasks assigned to student-investigator teams ranged from simple manual word counting in technical documents to the compilation of an annotated bibliography. In some instances, the student-investigators were given explicit instructions about "what" was to be done; in others, the students determined the "how to go about it". A detailed description of student-initiated methods of procedure and "Descriptor Build-Up Procedures" is given. Examples of tasks performed according to specific instructions and formats include extracting, indexing, data base preparation, preparation of a data base for a photo-interpreter's test cell, abstracting data from periodicals, and typing reports. (Author)

MISCELLANEOUS

PB-181 560(Rev.)
Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Mar 64.
OTS $1.25, $10.00/year

DESCRIPTORS: *Naval research, *Scientific research, Nitrogen, Oxides, Hydrogen, Steel, Ultrasonic radiation, Atmosphere, Sun, Radioactivity, Chemistry, Cameras, Plastics, Niobium, Zirconium, Submarines, Mechanics, Shock (Mechanics), Metallurgy, Ceramic materials, Fracture (Mechanics), Fatigue (Mechanics), Refractory materials, Iron, Nickel, Chromium alloys, Aluminum, Ruby, Radio, High frequency, Communication systems, Parametric amplifiers, Sound, Sonar equipment, Patents

Contents:
Articles:
The Radiation-Induced Chain Reaction Between Nitrous Oxide and Hydrogen in Aqueous Solutions, by C. H. Cheek and J. W. Swinnerton
A New Search Technique for Ultrasonic Inspection of Sheet Steel, by S. D. Hart and L. C. Cardinal
Scientific Program:
Atmosphere and Astrophysics: NRL satellite observatory monitors x-ray brightness of quiet sun. Characteristics of air filter media used for monitoring airborne radioactivity
Chemistry: X-ray fluorescence camera. Molecular structure and tensile properties of filament-winding plastics. Solubility of niobium-1% zirconium in sodium by activation analysis. Submarine atmosphere studies aboard the USS SCULPIN
Mechanics: Calibration study of the floating shock platform at the San Francisco Naval Shipyard—operations and instrumentation. Comparison of shock and isentropic heating in light-gas compression gun
Metallurgy and Ceramics: New test tool for full-thickness notch fracture determinations of high-strength structural materials. Metallographic study of fatigue damage. Influence of test conditions on the behavior of refractory metals. Niobium bicrystals. Ferromagnetic resonance of irradiated thin iron-nickel films. Oxidation mechanism of iron-chromium alloys in water vapor. High-temperature oxidation of molten aluminum. Low-cycle-fatigue crack propagation. Investigation of the rotating-beam test for low-cycle fatigue crack propagation studies. Development of high-strength structural steels
Optics: Optical tests on samples of ruby crystals
Radio: High-frequency communication and data transmission modems. Parametric amplifiers and upconverters
Sound: Five filial generations of Acartia tonsa grown in the laboratory for studying their response to acoustic stimuli. Performance and analysis of sonar transmitter which uses a parallel inverter unit.

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U.S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field Offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

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- Establishing a new business

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- Basic records of national income and product, regional trends, balance of payments, foreign aid

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- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

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- Development of new products
- Government-owned patents for free license
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FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

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